

The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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Canada's Growing Chemical Industry

THE announcement recently to hand of the Convention of Canadian Chemists at Toronto on May 27th and 28th last, prompts the reflection that British chemical manufacturers and users might do much worse than watch the progress which has been made during the war and since by manufacturing chemists in our premier Dominion. The advance made in several branches of the industry would appear to be such that there is a strong probability that Canada will work its way before very long to a commanding position in the trade, constituting important competition not only with the German chemists but with manufacturers in our own country. The demands of the British and Allied Governments during the war, and the cessation of German imports, brought about a number of minor developments in the Canadian chemical industry which, it may be remarked, is now carried on in some 634

different plants, distributed all over the Dominion, but mainly in Ontario and Quebec. The most important spheres of growth are probably to be sought for in the following branches of the industry: Acetic acid and its derivatives (both from acetylene and from the distillation of wood); fixed nitrogen; coal tar medicinals; heavy chemicals; metallurgy; and, though this may be no more than prospective, the commercial production of helium gas for aeronautical purposes.

The growth of the glacial acetic acid industry is, perhaps, the most outstanding development of them all, and has its centre at the Shawinigan Falls in the Province of Quebec, where a great city has grown up in ideal surroundings, and is engaged on numerous industries based on the utilisation of the water power being exploited there. The utilisation of water power, this time at Niagara Falls, has been instrumental in enabling chemists to set up there a vast plant for the production of cyanamide, and its conversion into ammonium salts for various purposes. Cyanide is used in enormous quantities in the refining of Canadian ores, and the industry at Niagara Falls will be capable of filling that demand with ease in addition to securing an important share of the world's orders for that product.

In coal-tar dyes no particular advance has yet been made, although in the former munition plant at Trenton, Ontario, the newly-established concern, Chemical Products, Ltd., proposes before long to utilise the nitric acid plant for the manufacture of dyestuffs and intermediates. This concern has, however, made remarkable progress in the production of salicylic acid, and expects before long to be producing from six to eight hundred tons of aspirin annually at the Trenton plant.

In the field of heavy chemicals several new plants have sprung up during the war, and facilities for the production of sulphuric, nitric, and mixed acids have been very largely increased. Soda ash and several other soda salts are now made in Canada, notably by the new plant of the Brunner-Mond concern, and it is believed by many that the gradual transformation of the sulphite and sulphate pulp mills of Canada into soda pulp plants will constitute an immense demand which may well swell the new industry to enormous proportions before very long. The by-products from the soda pulp plants are also likely to assume an important place in the world's markets in view of the dominant position which the Dominion already holds in the manufacture of wood pulp and paper.

With regard to helium gas, investigations made during the war by Professor J. C. McLennan on behalf of the Board of Invention and Research in London, have demonstrated that the largest potential source

of supply of helium at present known within the British Empire is located in Canada. Commercial methods of separating helium from the other gases with which it occurs have already been developed as a direct result of these investigations, and the production on a commercial scale in the Dominion is almost certain to follow before very long, as it is, of course, well known that for aeronautical purposes helium gas possesses qualities which render it vastly superior to hydrogen, even having regard to the difference in cost, at present almost prohibitive.

Lord Moulton's Message to Chemists

THE dinner given in honour of Lord Moulton last week by the British chemists and chemical manufacturers who were associated with him in war work, was an uncommonly well managed affair. We are disclosing no official secret in stating that it was due largely, if not mainly, to Dr. Stephen Miall who, by organising the gathering, added another useful act of service to the many he has rendered to chemistry. The speaking was of the best. Sir William Pope, who handles these matters with a very sure and delicate touch, paid a tribute to Lord Moulton which was full and generous, and yet always under perfect restraint; Mr. Emile Mond was no less happy in the terms in which he made the actual presentation.

Lord Moulton's speech in response was much more than a pleasant incursion into after-dinner reminiscences. It was a call to all engaged in chemistry to realise the public side of their work and to take the place in national life to which the importance of that work entitles them. Some of his points we have urged ourselves, and it is gratifying to have them recalled with the full weight of Lord Moulton's experience and authority behind them. When he took charge of our explosives supplies he was struck first by the fact that chemistry seemed to enter into every other industry and to play an indispensable part in all. We recently in this connection used the word "immanence"; Lord Moulton, coming of a line of learned biblical scholars and theologians, used the term "omnipresence." Next he wondered how it was that so important a profession seemed so unknown and so little appreciated by the public. And now with his exceptional experience to draw upon, he urges them to unite in peace as they did in war, to recognise the community of interest that binds them all together, and instead of seeking seclusion to take their proper part and place in national affairs.

These were no mere pious sentiments, for almost immediately, in the movement that is about to be started for raising funds for the proposed chemical headquarters in London, the chemical community of all sections will have an opportunity of responding to the call. We trust that the response will be as generous, united, and successful as it was for war purposes. And the appeal is entitled also to the support of the nation, if only in recognition of what chemists and chemical manufacturers have done to save the nation. Already it has been favourably noticed in the press. The three speeches on Wednesday evening received more attention in the leading London daily journals than the entire week's conference at Newcastle. If

the reason for this could be ascertained it would also probably furnish the answer to Lord Moulton's inquiry why the nation has not hitherto realised the vital importance of chemistry to national existence and progress; why chemistry, the widest of all professions in the range of its interests and its influence, has hitherto been the least known and the least honoured.

The State and Research

ONE effect of the recent letter of Lord Moulton to *The Times* will be to raise anew the subject of State endowment of industrial research. Whether or not it is for the good of the industry, it is hardly for us to decide. Personally, we are of opinion that it is. But the pivotal centre, particularly in view of recent law-court decisions, is the question of patent rights. Is the State to be regarded as an employer, or as a philanthropist? If the former, then all accruing interests will be vested in it. As a consequence, manufacturers would be permitted to exploit processes under a licence, and on payment of royalties, an equitable portion of which would be assigned to the inventor as reward and encouragement. The State—alias the taxpayer—would be a financier making a speculative investment in the inventor's brains, and the latter as an employee would not be able to pocket the proceeds. On the other hand, if the State be philanthropic, upon what system is a grant to be allocated? Certainly, some people would be anxious to know according to what principles the recipients would be selected. It is difficult to decide when academic research assumes an industrial import, and the germ of a highly profitable process often is discovered as a side-show in the university laboratory. Further, much research is intellectually brilliant but industrially useless. For the purposes of endowment, assuming the State to be philanthropic, where is the line of demarcation to be drawn, and how is one to avoid the acrimony that only too often might be engendered by the unsuccessful competition between scientific stars of diverse magnitudes?

The Choice of Refractories

As the working life of chemical and metallurgical plant is in many instances so greatly dependent upon the choice of suitable refractories, we believe that the article on the subject which Mr. A. B. Searle has already contributed to our columns will be very generally appreciated. The concluding part of Mr. Searle's article will be found elsewhere in this issue, and we feel that we owe, perhaps, some apology both to our readers and the author for the fact that some three or four weeks have elapsed since the publication of the first instalment. It will be appreciated, however, that, in a diverse industry such as the one we represent, important subjects which call for immediate publication are continually cropping up, so that the main difficulty with which we are faced is not so much what to put in but what to hold over. The obvious solution which must immediately suggest itself to the average reader is that of increasing our bulk. But we have to remember that as yet we are only a "yearling"; and already in the space of 12 months we have had permanently to enlarge upon our original size on no less than three occasions. This in itself is a matter for

considerable gratification, and may be taken as a justification of our confidence at the outset that so important an industry could well find room—without any damaging effect upon existing interests—for a paper run in such a way as to provide fare for the technically minded, as well as acting as a newsgatherer and a medium for the expression of opinion on current topics. We may, in fact, be forgiven for quoting the remarks of a recent correspondent who tells us that his most enjoyable meal during the week is breakfast on Saturday morning, for in lieu of porridge he always commences with *THE CHEMICAL AGE*.

But, to return to refractory subjects, a significant point which Mr. Searle brings out is that too much importance is attached to-day to the mere question of heat resistance. Up to a point actual refractoriness is, of course, an essential consideration, but in this direction there is nothing to be gained by introducing a high margin of safety, and in so doing to impair the capacity of the material to withstand influences other than heat. For instance, magnesite bricks may be excellent in many respects where a basic material is desirable; but unless due regard is paid to their properties they are unsatisfactory because they are mechanically weak and have a feeble resistance to abrasion. In the case of crucibles, some refractoriness and capability to withstand corrosion must usually be sacrificed in order to ensure that the material will be unharmed by changes in temperature. Again, in smelting a metal such as copper, the resistance to corrosion is more important than excessive refractoriness, though sufficient of the latter property is, of course, essential. Unfortunately, the various properties demanded of refractories introduce, so far as manufacture is concerned, a long list of contradictory requirements, and it would seem that success chiefly depends upon the skill with which the essential qualities are combined.

The Problem of Heat Insulation

EVERY chemical engineer to-day is out to do his best in the way of heat conservation, and to avoid the waste of fuel by retaining as much heat as possible in those portions of the plant where it does useful work. Loss of sensible heat from muffles, producers, and many other forms of apparatus employed on chemical works takes place by radiation and conduction from the containing walls; and, apart from its escape making working conditions more trying, any serious loss has a more appreciable effect on the thermal efficiency of the apparatus than is usually supposed. It is a peculiar, but none the less obvious, fact that while steam pipes are usually lagged with the most zealous care, the larger pieces of plant are frequently neglected. A round of some of the best-conducted works leaves the impression that, in spite of the high cost of all fuels, a considerable amount of heat is unnecessarily being thrown away, and one is tempted to ask whether the chemical engineer knows as much about the use of insulating materials as he should do. As regards high-temperature furnaces it is generally found that the maximum attainable temperature is limited to a considerable extent by the leakage of heat through the walls, and one authority has shown that a gas muffle

fitted in a laboratory attained a temperature of $1,300^{\circ}\text{C}$. in four hours when in its original form, whereas by covering the outside walls with a 2-inch layer of magnesia-asbestos composition the period was reduced to less than two hours, with a considerable increase in the comfort of those working in the vicinity of the furnace.

The materials which are more commonly employed to-day for heat retention are slag-wool, asbestos, magnesia, and the so-called infusional earths of a diatomaceous nature. For small apparatus requiring only a trivial quantity of material there is no question that slag wool is to be preferred. It is an excellent insulator, consisting chemically of calcium silicate, and will withstand a moderately high temperature without losing its physical characteristics. For large producers and furnaces the fashion to-day is to employ a covering of the extremely light diatomaceous tiles, of which there are now many different varieties. The raw product from which these tiles are made is composed of the siliceous remains of minute aquatic plants, which originally secreted silica in the process of building their shells. The raw material consists, therefore, principally of the silica shells of diatoms, the finished article containing about 92 per cent. of silica, and the insulating efficiency depending almost solely on the air spaces enclosed by the cells. The chief point of interest, however, is the argument which prevails as to whether diatomaceous bricks are really effective retainers of heat. Authorities on the subject appear to disagree. For instance, E. Griffiths says that the material has an extremely low thermal conductivity, and from a series of experiments he has shown that its coefficient of conductivity (in C.G.S. units) is in the neighbourhood of 0.00035, as compared with an average figure of 0.0002 for slag wool. On the other hand, two American investigators, Willard and Lichty, point to the fact that though air-space construction is of decided value at low temperatures, it is not so at high temperatures, while Dr. Mellor has expressed the opinion that at ordinary temperatures the quantity of heat travelling through porous bricks by conduction is much greater than the amount travelling by radiation across the pore spaces. By making a calculation for material with pores 0.1 cm. across, with a temperature of $1,400^{\circ}\text{C}$., he found that the quantity of heat carried per second across the air space and through the solid material is the same. Smaller pores would make the temperature higher, and larger pores would make it lower. With pores 0.5 cm. across the insulating properties begin to break down above 730°C . It is understood that Dr. Mellor and his assistants are at present engaged in a further investigation of the matter, and it is to be hoped that they will be able to clear up the point at issue. Diatomaceous bricks are by no means cheap, and those who favour their adoption would be glad to feel that the thermal saving effected is worth the initial outlay.

The Calendar

Aug. 9	Society of Chemical Industry General Meeting. 4.30 p.m.	Central House, Finsbury Square, London.
24-28	British Association	Cardiff.

Lord Moulton's Services to the Nation

A Tribute from British Chemists and Chemical Manufacturers

At the Savoy Hotel, London, on Wednesday evening, July 21, a large and distinguished company of representative British chemists and chemical manufacturers assembled at a dinner organised in honour of Lord Moulton, and in recognition of his national services during the war. Sir W. J. Pope, of Cambridge, the new President of the Society of Chemical Industry, presided, and in addition to the guest of the evening, the following were present:—

Sir Hugh Bell, Sir Edward Brotherton, Sir R. Waley Cohen, Sir Richard Garton, Sir Harry Goschen, Sir Alfred Mond, Sir Frederick Nathan, Sir Robert Pearce, Sir Keith Price, Sir Robert Robertson, Sir Joseph Turner, Sir William Wayland, Dr. E. F. Armstrong, Mr. H. L. Armstrong, Professor H. E. Armstrong, Mr. F. W. Atack, Mr. A. Bazire, Mr. W. D. Borland, Mr. R. B. Brown, Mr. Roscoe Brunner, Dr. J. C. Cain, Dr. C. C. Carpenter, Mr. F. H. Carr, Mr. A. Chaston Chapman, Mr. E. Connah, Hon. H. S. Davey, Professor Donnan, Dr. Bernard Dyer, Mr. E. V. Evans, Dr. R. C. Farmer, Dr. M. O. Forster, Mr. F. E. Hamer, Mr. F. W. Harbord, Dr. J. T. Hewitt, Mr. C. T. Heycock, Mr. H. A. Humphrey, Mr. L. A. Jordan, Mr. C. B. Lender, Mr. T. R. Lankshew, Mr. J. W. Leitch, Mr. W. J. Leonard, Major H. R. Le Sueur, Dr. H. Levinstein, Professor H. Louis, Professor T. M. Lowry, Mr. W. H. McClelland, Mr. W. Macnab, Mr. A. G. Mathews, Dr. Stephen Miall, Mr. Emile S. Mond, Mr. Robert Mond, Mr. R. C. Perry, Mr. W. F. Reid, Dr. S. Rideal, Dr. E. K. Rideal, Dr. R. Seligman, Dr. O. Silberrad, Mr. A. T. Smith, Mr. J. H. Stephens, Mr. A. W. Tangye, Professor Jocelyn Thorpe, Dr. E. H. Tripp, Mr. Milne Watson, Mr. P. E. Wickham, Dr. E. C. B. Wilbraham, Mr. J. W. Monier-Williams, Mr. W. J. V. Woolcock, M.P., Professor W. P. Wynne.

Sir W. J. Pope

After the toast of "The King," the chairman proposed the health of Lord Moulton.

"Our meeting this evening (he said) is somewhat exclusive in composition; it consists of a number of men interested in the advancement either of chemical science or of chemical technology. We are met to express our whole-hearted respect and gratitude to one who is not a chemist by profession for the signal services which he rendered to our country during the tragic period of the recent war and for the genius which he showed in organising the chemical profession of Great Britain so as to utilise its best powers in our common aim, the defence of our country. (Cheers.)

At the opening of hostilities in August, 1914, our country was ill-prepared to meet the vast chemical liabilities thrust upon it. The productive capacity of the Empire in the matter of propellant and high explosives was limited to the quantities required for practice purposes, and no programme for manufacture on the scale set by the exigencies of modern warfare had been prepared. The appointment of Lord Moulton as Director-General of Explosives Supplies led to a development of production which grew with constantly accelerated velocity until at the date of the Armistice each man, woman and child in these islands was producing an average of some ounces daily of explosive materials for purposes of war.

It is difficult to exaggerate the wonder of this achievement. Starting with a peace chemical industry built up solely for commercial purposes, in which no organisation for war had been contemplated, in which no census of production had been established, and in which no one man existed who realised the potentialities of the country for chemical manufacture, the Director succeeded in a short time in creating order, in eliciting

unanimity of object, and in uniting the most diverse interests, with the result that the schemes for manufacture of offensive war material which had been carefully elaborated during forty years by our late enemies were overwhelmed upon the question of mere mass production.

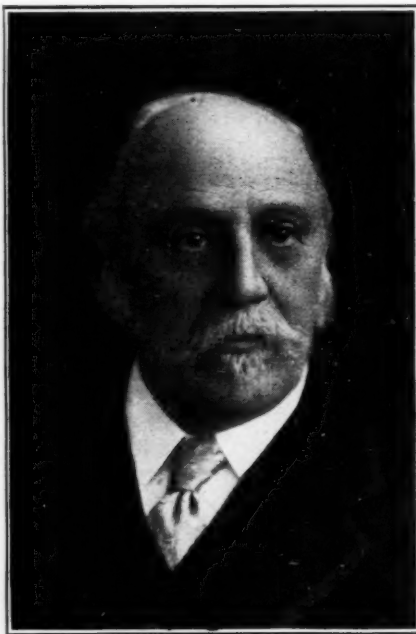
The British success in production set in when a gentleman, who had been the recipient of every honour in the gift of science, of his university, of his profession, and of his King, and who had attained such an age and such a position in life as richly entitled him to take his ease, embarked upon a great adventure. To assume the office of Director-General of Explosives Supplies at a moment of crisis was a great adventure. Nothing succeeds like success, but, at the same time, nothing fails as disastrously as failure, and this, the greatest Empire the world has ever seen, might well have been swept away had a weaker man than our guest of this evening been placed in charge (cheers).

The Secret of Lord Moulton's Success

What was the secret of this success? It was that Lord Moulton, by the exercise of some mysterious faculty, was able to co-ordinate the activities of a vast number of individuals and of corporations who were each doing their best in a thoroughly individualistic spirit, but who were getting in each other's way. He drew around him from all parts of the earth a host which comprised the major part of the scientific and technical chemical talent of our race. This host consisted in part of the sober, solid and sedate practitioners in chemical science and technology—the kind of men who become churchwardens + (laughter)—and it is this portion of your army, sir, who have the honour of receiving you as their guest this evening. We had also with us a number of men who formed as magnificent a band of glorious desperadoes as ever sailed under the skull and crossbones. The Director-General organised his heterogeneous forces so as best to utilise the talents of each member and in such a way that all perforce had to work together for the common cause and to the elimination of any personal predilections or prejudices. Throughout my numerous sporadic incursions into your department, sir, I heard and shared in many hot discussions between members of your staff, but I never heard one word spoken which could be interpreted as disloyal to your administration, to your methods,

or to your decisions. (Cheers.)

To-day, when the struggle is ended, and you have brought your great adventure to a great conclusion, you will, I am sure, grant us the satisfaction of believing that we also have had, under your leadership, each one of us, the great adventure of his life. We have seen, further, that a master in organisation can force the whole chemical interests of the Empire, academic, scientific, and technical, to march together in furtherance of a common object, and we have seen you apply the same methods and evoke the same spirit in your work connected with the organisation of production for chemical warfare, with the establishment of the coal-tar colour industry in this country, and with the important inquiries conducted by the Nitrogen Products Committee. All these triumphs of the co-operative spirit have been achieved during the stress of war, but efforts, no less intense, are now being called for in order that our wartime successes may be consolidated and developed.



LORD MOULTON, P.C., F.R.S.

A Great Need and Opportunity

While strenuous attempts are being made, and with very considerable success, to expand and develop our chemical industries, to secure financial aid for the training of men in the methods of chemical research in our universities and colleges, and to direct a larger proportion of the young and vigorous intelligence of our country towards a career in chemical technology, one essential branch of chemical activity still awaits the necessary financial stimulus. The societies which represent the general and corporate interests of the various sections of pure and applied chemistry are ill-housed and ill-endowed, and the accommodation and the resources at their command are entirely inadequate for their rapidly growing membership; the funds at their disposal are so insufficient as to make impossible any of the important schemes for publication which await their attention. They are unable to build up such a joint library as would be properly representative of the present position of chemical literature, and, if they were in possession of such a library, they would, under present conditions, have no place for its reception.

The urgent necessity for the provision of funds for the purposes to which I have just referred will be realised by everyone who acquaints himself with the work done by our chemical societies. The whole development of scientific and technical chemistry is centred in these great organisations: they furnish the intellectual stimulus so essential to the younger men who are preparing to carry on the work now in the hands of the older. It would be impossible to overrate the services rendered to pure and applied chemistry by the Chemical Society and the Society of Chemical Industry and by many of the smaller more specialised societies.

This is a question which for some time has engaged the attention of the Federal Council for Pure and Applied Chemistry, and an appeal for funds is now about to be issued under the leadership of Lord Moulton. We cannot doubt but that the chemical industries of the country, which now represent such gigantic financial interests, will co-operate with our guest for this purpose with the same unanimity and the same public spirit as they showed during the war. (Cheers.)

Mr. Emile Mond

On behalf of the guests and amid much cheering Mr. Emile Mond then presented to Lord Moulton a massive Georgian silver loving cup, with an inscription testifying the admiration of the donors for his character and national services.

This gift (said Mr. Mond) which the chemists and chemical manufacturers of this country desire to present to Lord Moulton is a memento of a great achievement. Our action is prompted entirely by the deep sentiment of admiration and gratitude towards him which we feel in our hearts. During the war we have been closely associated with him, and have shared with him to a milder extent the great burden of anxiety and responsibility which he has borne so nobly during the days of trial. Better than any others, we have been able to appreciate the magnificent success that has crowned his efforts. At times his gigantic task must have seemed almost hopeless, but even in the darkest hours his fortitude and his genius never failed. (Cheers.) Whether on the land, on the sea, or in the air, he always had the conviction that we should come through the struggle victorious, and it was his watchful foresight and provision that did so much to realise that conviction. (Cheers.)

We chemists and chemical manufacturers have very special reasons to be proud and grateful to Lord Moulton. (Hear, hear.) We are proud to have served in that great industrial army which he called around him. We are grateful to him for the ever stimulating interest, for the unfailing courtesy, which characterised all his dealings with us. That is the spirit in which we ask Lord Moulton to accept this gift which, as the inscription bears witness, is presented to him in recognition of the invaluable services rendered by him to his country and the Allies during the great war 1914-18, by the chemists and chemical manufacturers who were privileged to serve under him. (Cheers.) Lord Moulton, we all wish you many years of health and prosperity, and we trust that out of this cup you will drink long draughts of that elixir of life of which you seem to have conquered the secret, so that for many years to come you may still be at the service of your country should the need arise. (Cheers.)

Lord Moulton

The presentation was accompanied by a remarkable demonstration, and Lord Moulton was obviously touched.

You have most if not all of you (he said, in acknowledging the gift) known me during the years of the war, and everyone of you will realise how touched I am to hear such words of eulogy spoken by Sir William Pope and Mr. Emile Mond, and so warmly responded to by you. You can realise how they go straight to my heart. I can assure you that such an occasion as this not only will never be forgotten: it will be recalled by me as one which comes very rarely to any human being in his life. I feel almost ashamed to hear this praise, because as I look around I see nothing but the faces of people who merit it. My work was done simply because you helped me to do it. When I took up my task I took it up with the certainty that I should succeed. I knew some English chemists and one or two chemical manufacturers, and I felt sure that I should find in my countrymen the resources which I could call upon, and which would not fail me in the day of trial. (Cheers.) As I look round I can scarcely see a face that I do not associate with some moment of despair, some crisis when we wanted help, when I appealed to the right quarter and found an immediate and hearty response. It seems to me that those who ought to have had their health drunk were rather yourselves than myself. Mine was the privilege, the privilege of calling on you all to put aside every consideration for the sake of saving your country. (Cheers.)

The real meaning of it is that I am a kind of embodiment of the roll call to the chemists of England, which showed the world that whatever had been our negligence in the past it was dangerous to touch us. (Cheers.) Before the end of the war the Department of Explosives Supplies had invaded nearly every house and taken under control nearly every industry on the ground that it bore upon the business I had to do, but that was simply because chemistry itself permeates all our industries, and I was the one who had to show to the English nation how chemistry went into every portion of its life, and how the fibres of its rootlets were inextricably mixed with every industrial enterprise. I can scarcely think of an industry that did not grumble at me; I can think of none that did not support me.

Omnipresence of Chemistry in Industry

Now, gentlemen, that was a great revelation to me. I knew that we had a huge trade both at home and abroad in the heavy chemical industry, but I had never realised—I do not suppose many people in England do realise—how chemistry permeates every industry that exists, how omnipresent it is in every human effort, how its own prosperity brings prosperity to every other form of industry. I learnt this first when at the outbreak of war I took up the question of explosives. I was asked to look into those matters where formerly we had been dependent on Germany, and where, therefore, we were feeling a difficulty in getting our supplies. I found that practically all these ultimately became chemical questions, which we were perfectly capable of dealing with ourselves, but which we had neglected, and accepted the position of relying on Germany. It was thus that I learnt the omnipresence of chemistry.

Now, whose fault was it that we did not realise it earlier? I think it was largely your own fault. Where is there the unity among chemists to make the nation feel how they are essential to its very existence and progress? Formerly, it is true, people kept their discoveries to themselves, and a master of chemical industry who looked upon his brother otherwise than as a rival was unknown. All the other sciences—mechanics, engineering, electricity and so on—fraternise together, and the nation feels their greatness; their word is listened to and sways even the decisions of Parliament. But where do you find chemists joining to assert their essential importance? As I went through the war, gathering together scattered bodies of thinkers, scientists and great industrial directors, I felt I was bringing them, under the spell of their desire to help their country, into a unity they had never entered into before. (Cheers.) I am glad to testify that the men I gathered round me, and whose ability I look to as the foundation of this nation's future, all and always were willing to work together, always desirous to respond to the appeals for help. They made such an impression on me that when the

time came to part I advised them all to have nothing to do with Government, but to get into industry, and through chemistry help to raise the standard of English industry.

A Call for Unity

Why should this lesson, which impressed me so much, be lost on you? Why should not chemists take the position and announce to the world that they have taken the position that chemists and chemistry lie at the root of the nation's prosperity? Why should you be divided up so much? If you give to one another in time of peace the assistance you willingly and without hesitation lavished on one another in time of war, you will make England secure what it has not secured by the war, a position such as it ought to have among the nations in industry. I respond most heartily to the exhortation of Sir William Pope in this respect. I do not think our future will be sure until chemist is brother to chemist; we shall go on best by continuing the hearty co-operation that lasted during the war, and by which alone we shall attain our proper position. How much more worthy you are to be united in a great body, and to be recognised as a scientific whole than many of those who have far more influence, not because they have less jealousies, but because they are more intimate one with another. Take my advice. Unite; hold high the standard of chemistry and chemical industry; and there will be a brilliant future for you not only industrially, but in the respect that is paid to your profession by the nation. (Cheers.)

In conclusion, I wish to assure you all that your faces remain in my mind as memories of the most delightful time of my life, when I had to succeed for the sake of my country, and you were the people who brought the success. (Loud cheers.)

The proceedings closed with the toast of "The Chairman," proposed by Sir Hugh Bell.

Reviews

ANIMAL AND VEGETABLE OILS, FATS AND WAXES. By Geoffrey Martin, D.Sc., Ph.D., F.I.C. London: Crosby, Lockwood & Son. 12s. 6d.

This is an age of encyclopædias and various more or less meritorious efforts at condensing information for the general reader, but we have seldom seen an attempt in this direction so ambitious as the present small volume.

The author sets out within the narrow limits of 200 odd pages to discuss (quoting from the title) "The Manufacture, Refining and Analysis of Animal and Vegetable Oils, Fats and Waxes, including the Manufacture of Candles, Margarine and Butter." However praiseworthy such an attempt may appear—although we ourselves are by no means convinced of the utility of carrying abbreviation to these lengths—the result is in this case the reverse of satisfactory.

At a casual glance, the book resembles nothing so much as a catalogue of engineering plant and machinery, and although this is not altogether borne out on a closer examination, it must be admitted that later impressions are not much more favourable. Taking, for instance, the chemical side of the subject, we find that this is dealt with in five pages, of which the first is almost entirely occupied with a bibliography of the subject, and the last two devoted to imports and exports. Similarly, the classification and description of the animal and vegetable oils, fats and waxes—to which Dr. Lewkowitsch in his standard work devotes the whole of his second volume of 1,200 pages odd—is dismissed in 20 pages, of which six are occupied with tables of figures; whilst the whole subject of the chemical examination and analysis of oils occupies only 11 pages. In the latter case, the author himself appears to have some misgivings on the subject and has made a belated attempt to improve matters by the insertion in the appendix, without comment, of an official report of the Ministry of Food on Standard Methods of Analysis. We are afraid that this does not go very far in adjusting matters.

With regard to the technological parts of the subject, the results of such a drastic condensation are still more deplorable. The manufacture and analysis of butter is elucidated in five pages, of which two are mainly occupied with tables of colour tests, whilst the enormous subject of the manufacture and analysis of margarine is discussed in a further five pages, if we except two devoted to trade statistics. Incidentally, the latter would be of greater interest if more recent figures were cited.

The book is one of a series of "Manuals of Chemical Technology," and in these days of thirst after superficial knowledge, such works supply, in many cases, a demand which, if not altogether healthy, is at any rate genuine enough. We know of several books of this type which are quite excellent in their way. In the present instance, however, the field to be covered is much too wide to be susceptible of treatment in this manner with any degree of success. For the general reader, who is unfamiliar with the technical jargon proper to the industry, there is insufficient space in which to add the necessary explanatory matter, while in the case of the technical reader, the information vouchsafed is altogether inadequate to his requirements.

A possible exception to the foregoing criticism is the part of the subject dealing with the hardening or hydrogenation of fats, to which is devoted 30 pages. This chapter contains quite a detailed summary of the principal processes in use, but it also serves to show the difficulty of preserving a due proportion in the treatment of so wide a subject in so small a compass.

As might be expected, some important parts of the subject have had to be excluded from consideration. Thus, although Chapter XI. attempts to deal, as previously stated, with the analysis of fatty oils, there appears to be no section devoted to the analysis of the waxes. When so much important and essential matter is crowded out, it appears somewhat gratuitous to insert chapters on the treatment of "metal turnings and waste rags in engineering shops," and on "the manufacture of fish meal and guano."

A large number of illustrations of plant from the makers' catalogues appear in the text and, being well reproduced, these perhaps furnish the chief interest.

The selection of type and the general get-up of the book are good, although it is difficult to see the utility of providing so many blank pages and half-title pages to chapters, when space is obviously so precious.

P.J.F.

WHITE LEAD—ITS USE IN PAINT. By Alvah H. Sabin, M.S., D.Sc. London: Chapman & Hall. Pp. 120. 7s. 6d.

It is rather difficult to classify the type of person to whom this book will appeal, or to point out those sections of the trade to whom it might be useful. It is evidently written specially for students of the paint trade, for it is really an expanded treatise on white lead and its uses, but it also will repay study by those professionals who know all about the practical side of their work and are interested in the theoretical.

To the general reader, it is a pleasant little manual, written in a clear style without embellishment.

The first few sections outline the history and method of manufacturing white lead. As is generally known, this substance is the basic principle of most paints. It is true there are other white pigments such as zinc oxide and basic lead sulphate, but their number is small, and they have, with the exception of zinc oxide, faults, and are less durable than the white-lead pigment. The old (and modern) "Dutch process," the Carter process, the "Mild" and Chamber processes are all fully described in compact little sections, without any cumbersome formula. The general ingredients are: lead, acetic acid, moisture, heat and carbonic acid—the product being basic lead carbonate. The processes differ in procedure only, the ultimate idea being the formation of a basic acetate, which is decomposed by carbonic acid with formation of a basic carbonate. In the Rowley or "mild" process only, is acetic acid dispensed with, the hydration of the lead being accomplished in a mechanical manner.

Drying by the "pan" and "pulp" methods is fully described and there follows a little series of notes on washing, fineness, opacity, adhesion, &c.

The remainder of the book deals with paint and painting proper. One or two little fallacies are exposed; for instance, it is often said that white lead causes certain colours to fade or change colour. It appears it is extremely doubtful if the lead has any effect on the majority of colours—if there be any effect, it must simply be due to the action of light. A similar idea that white lead is liable to be discoloured by sulphuretted hydrogen, is proved to be groundless.

The latter sections on brushes, oils, and general painting practice are very interesting, and there is a table of costs and painting formulae attached to the index.

C.A.

Refractory Materials for Chemical Purposes—II.

By A. B. Searle

The first part of Mr. Searle's article appeared in our issue of June 26, when attention was given to the main considerations which must be taken into account when selecting refractories. In the concluding instalment, published below, the writer draws attention to the effect of various chemical substances on fireclays, and indicates how corrosion, &c., may be overcome.

THE action of sodium compounds—notably the acid sulphate, NaHSO_4 , commonly known as nitre cake, and the neutral sulphate, Na_2SO_4 , known as salt cake—is severe, especially if the exposed surface of the refractory material is rough and porous. On a smooth and well vitrified material the action is much less. The action of boracic acid on siliceous and fireclay bricks is very severe—far greater than would be anticipated from its acid character. Great care is, therefore, needed in selecting refractory materials to be heated in contact with boracic acid or borax, to choose those which are well vitrified and of a close or dense structure. In cases of corrosion generally, the effect is found to be chiefly controlled by mass action. If the refractory material is porous, and therefore presents a large surface to the corroding agent, the extent of the attack will be correspondingly serious. If, on the contrary, the refractory material consists of relatively large pieces of a dense and compact nature, and so presenting a minimum of surface, the corrosion will take place so slowly as to bring it outside ordinary commercial considerations.

The action of acids—either liquid or vapours—on aluminous and siliceous refractory materials is chiefly dependent on their porosity. On impermeable products, this action is almost negligible, but a highly porous fireclay brick is rapidly corroded by sulphuric acid. Silica is attacked much less violently, but the calcium silicate bond which unites the grains in silica bricks is seriously corroded if the surface of the bricks is not quite smooth. In some cases, "whitewashing" the surface of the structure with a suspension of gelatinous silica will greatly reduce the corrosive effect of the acid.

Steam, especially if wet, has a highly corrosive action on porous fireclay bricks and silica bricks, but glazed or vitrified clay ware is not appreciably affected. Sulphur dioxide and other sulphur compounds have a highly corrosive effect on siliceous and aluminous refractories, but this is greatly reduced where impervious or vitrified ware or bricks is used. Iron pyrites (FeS_2) is particularly difficult as in contact with either clay or silica under reducing conditions it forms a highly fusible slag-like material, the basis of which is a ferrous silicate. Under some conditions, this slag swells and "blows out" leaving objectionable hollows and fissures which are readily corroded. The slags produced in many chemical reactions include some of the most corrosive substances to which refractory materials are exposed. Lead oxide and the simpler lead salts form particularly fusible compounds with clay and silica so that when such lead compounds are present all possible precautions must be taken to keep the permeability of the refractory material at a minimum whilst, at the same time, securing sufficient refractoriness and unsensitiveness to sudden changes in temperature. Most other slags are less corrosive, but their action is sufficiently severe to be of great commercial importance, and similar precautions should be taken. It is the experience of manufacturers of materials in which large quantities of slag are produced, that the extent of corrosion depends less on the chemical composition of the refractory material than on the compactness of its surface. Numerous large scale tests have shown for example, that silica and fireclay bricks may be used advantageously in steel furnaces in which a highly basic (calcareous) slag is produced provided that the bricks are sufficiently impervious to present a minimum area to the corrosive action of the slag. If porous bricks

are used, however, rapid corrosion occurs. The use of magnesite bricks in contact with acid slags is less favourable because the texture of the bricks is coarse and more open, so that the physical conditions are more favourable to chemical corrosion. Experiments on a small scale on completely fused magnesia show that the action of acid slags on a mass of this dense material is scarcely appreciable, but if it is reduced to a coarse powder it is rapidly dissolved by the slag.

Corrosion by Vapours

Closely allied to slag-corrosion is the action of glass and of those partially prepared glasses known as frits. In this case also, the minimum effect is produced if the surface of the structure is as smooth and impervious as possible with the thinnest possible joints between the bricks or blocks. One reason why bricks laid on end are more durable than those laid as stretchers is that the ends of the bricks are usually denser than the sides or faces.

Corrosion by metallic vapours occurs in some metallurgical operations, the most striking example being the action of zinc vapour on the retorts in which the metal is distilled. Owing to the necessity for their withstanding sudden changes in temperature, these retorts are necessarily of a porous nature so that the zinc can readily penetrate into the refractory material where it is soon oxidised and converted into aluminate and silicate, with eventual destruction of the retort and the loss of a considerable proportion of the metal. Resistance to reduction and oxidation is usually possessed in a high degree by most refractory materials and in working on a large scale it is not infrequently found that they behave differently from what would be anticipated. Thus, carborundum (CSi) is readily oxidised when a small quantity of the finely powered material is heated in a current of air, but flues or gas-ducts made of carborundum are very durable as when sufficiently heated a film of fused silica forms on the surface of the material and efficiently protects it from any further oxidation. The remarkably slow rate at which graphite is oxidised in a furnace is well known to users of plumbago crucibles the durability of which is largely due to the compactness of the material and the formation of a protective glassy film. In both these cases, as in many others, the influence of mass may make a great difference in effect produced. Almost the only case in which the effect of oxidation or reduction of a refractory material need be taken into consideration is in the passage of carbon monoxide or hydrocarbon gases through flues or chambers built of or containing red hot fireclay bricks. Under severe conditions there is a somewhat rapid decomposition of the gases with consequent liberation of free carbon which may choke the passages. Resistance to wear and tear and accidental blows must usually be secured by the production of a sintered material which may, with advantage, be combined with the sponge-like structure previously mentioned. The harder the material—provided it is not brittle—the greater will be its resistance to wear and tear and as the hardness of refractory materials is usually associated with the products of their sintering or partial fusion, it is clear that for heavy wear and tear a vitrified texture is desirable.

Resistance to sudden changes in temperature is extremely difficult to secure, especially when large quantities of dense refractory material have to be used. Where a porous material is suitable great resistance to sudden changes in

temperature is easily secured, but such a material is necessarily low in resistance to abrasion and corrosion, and so is useless for many purposes. When the pores in a refractory material are filled with fused material or "binder" the product becomes very sensitive to sudden changes in temperature. By replacing an infusible material, such as graphite, non-porosity combined with high resistance to sudden changes in temperature is secured, but the effect of the graphite must then be considered.

Thermal Insulation

Thermal conductivity is often of much greater importance in the chemical industries than in others in which refractory materials are used. In the latter, thermal insulating power is more important. With the exception of graphite, all highly refractory materials are of low thermal conductivity, but they differ considerably among themselves with respect to the rate at which heat can be transmitted through them. Thus, silica bricks are more conductive than fireclay bricks, and when used in the construction of reverberatory furnaces, kilns and the like, they should be covered or faced externally with a highly porous material, such as kieselguhr. This relatively greater thermal conductivity of silica bricks is very important in the construction of retorts, coke ovens and muffle furnaces, and often determines the selection of silica in preference to fireclay for these purposes. Where fused silica or quartz-glass vessels can be used their greater thermal conductivity gives them a considerable technical advantage over similar vessels made of fireclay. Unfortunately, there is a great scarcity of data with respect to the thermal conductivity of different refractory materials at the temperature and under the conditions of actual use and before full advantage can be taken of the relative conductivities it is necessary that further data should be obtained.

From what has already been written it will be clear that no single material can combine each of the foregoing qualities in its entirety, as some of them are mutually incompatible. For example, where a high resistance to abrasion is desired, it will best be obtained by the use of a vitrified or partially fused material, yet by its very nature, such a material cannot be resistant to heat as one which is less fusible. It is, therefore, necessary to compromise, and considering what is required some system of "marks" may be used with advantage in order to decide what is the relative importance of each desired property.

For instance, in smelting a metal such as copper the resistance to corrosion is more important than high refractoriness though sufficient resistance to heat is of course, essential. As these two qualities cannot both be obtained in their entirety in any commercial refractory material available for the purpose it is better, in this case, to sacrifice some refractoriness in order to secure a maximum resistance to corrosion.

Requirements of Crucibles

In the case of crucibles, some refractoriness and resistance to corrosion must usually be sacrificed in order to secure sufficient unsensitiveness to changes in temperature, or where the latter is less important it may be necessary to use a fresh crucible for every charge.

In some branches of chemical industry too much importance is attached to mere heat resistance, whereas this is often a minor consideration, and the chief emphasis ought to be laid on some other property. On the other hand, in industries where electric furnaces are used the most vital limiting factor in the development is in adequate refractories at present on the market. The increase in mechanical and dielectric strains on high tension insulators can only be met by superior refractory materials. New alloys and glasses also demand a superior refractory material. Although special materials, such as pure silicon carbide, fused alumina, sintered magnesia fused spinels, crystallised sillimanite,

calcined zirconia, &c., will be increasingly used, most of the new requirements in the above-mentioned industries will be met by intelligent adaptation of materials in general use, probably by fusing them so that they attain more complete chemical stability and constancy in volume, by producing them in larger pieces or in the form of single vessels so that little or no jointing material may be used. Joints are, in fact, one of the chief sources of weakness in refractory structures as it is seldom possible to have the jointing or cementing material as compact and resistant as the refractory article.

In other branches of chemical industry, insufficient attention is paid to the effect of pressure on the refractory material. Thus, magnesite bricks are excellent in many respects where a basic material is desirable, but unless due regard is paid to their properties they are unsatisfactory because they are mechanically weak, and have a feeble resistance to abrasion. Moreover, when magnesite is heated it expands considerably, the maximum expansion occurring at $1,350^{\circ}\text{C}$; on this account magnesia bricks tend to spall when cooled too rapidly. In several cases—especially in back walls, bulk heads and gas ports of basic open-hearth furnaces and in the side walls of electric steel furnaces—soft steel boxes filled with compressed dead-burned magnesia are preferable to magnesite bricks. The exposed face of the steel container melts and impregnates the magnesia forming a jointless surface with very small tendency to spall.

In some of the plant used in the chemical and allied industries different refractory materials should be used in various parts, thus, in a gas plant the combustion chamber, retorts and connecting blocks, exposed to $1,550^{\circ}\text{C}$., a high grade silica material should be used with over 96 per cent. of silica and about 1.5 per cent. of lime. In recuperators, with a temperature range of 850 – $1,100^{\circ}\text{C}$. and at the top and bottom of the retorts, fireclay is preferred on account of its small coefficient of expansion and resistance to spalling. The outer walls are made of a lower grade firebrick. The whole bench should be insulated with kieselguhr.

Water Gas Generators

In water-gas apparatus the effect of high temperatures, abrasion, slagging and spalling demand special consideration. In the generator, the lining is subjected to abrasion by the fuel, particles whirled about by the blast, and by the pokers and other tools. In the combustion zone, the lining is subjected to high temperature, slagging action from the fuel-ash, some abrasion by the fuel and more or less serious abrasion by the clinker. In the lower portion of the generator, the lining is subjected to the effect of steam, hot gases and the effect of tools in removing the clinker. In the connecting ducts, there are high temperature, erosion by particle of fuel and slagging action of the ash. In the carburettor, the chequer bricks and crown are subjected to high temperature and sudden cooling, causing spalling. The usual lining for generators is fireclay brick; silica and magnesite bricks are not successful owing to the changes in temperature. Chromite, zirconia, and carborundum bricks seem good as they reduce the adhesion of slag to the lining, and therefore the amount of cleaning required, but they are far more costly than fireclay or silica bricks. For chequer work, bricks rich in grog are best. In many chemical works, the use of refractory materials is largely confined to stone-ware and its ultimate heat resistance is of very minor importance in comparison with resistance to acid and pressure at relatively low temperatures. Such ware is therefore best considered independently and not under the caption "refractory materials."

Sir Halford J. Mackinder, chairman of Electro-Bleach and By-Products, Ltd., and Mr. E. G. Cubitt, have retired from the board of that company, the exchange of shares with Brunner, Mond & Co., having now been carried through.

British Alkali Works

Annual Report of the Chief Inspector

Mr. W. S. Culphey, the Chief Inspector under the Alkali Act, has just issued his Report for the year 1919. It is to be noted that there has been some considerable reduction, as compared with 1918, in the number of works carrying on the manufacture of sulphuric, nitric, and picric acids—a natural result of the curtailed demand for explosives. We propose dealing with the Report in two instalments, the second of which will be given next week.

THE number of works registered in England, Ireland, and Wales was, during the year 1919, 1,403. In Scotland the number was 165, making a total of 1,568 for the United Kingdom as compared with 1,580 in 1918. In many works more than one separate process is carried on, and the number of separate plants under inspection was 2,288, compared with 2,352 in 1918, and 2,326 in 1917. As regards the more important processes the following table shows the position:—

Works in Operation		1917	1918	1919
Sulphuric Acid ...	...	147	146	140
" (Class II.)	...	137	138	116
Nitric Acid ...	...	101	96	83
Sulphate of Ammonia ...	...	634	632	632
Chlorine ...	...	30	32	25
Picric Acid ...	...	21	15	5
Tar ...	...	360	375	376

As regards administration Mr. Herbert Porter has been released by the Ministry of Munitions and has returned to his duties. He has rejoined the general staff of inspectors, in which there was a vacancy through the death of Mr. Jackson in 1916. Captain A. C. Carter has, on demobilisation, returned to the S. Wales district to relieve Dr. Fryer, who had charge of two districts, while Mr. H. J. Bailey, was also able to take up his appointment again after release from the Ministry of Munitions.

Resumption of Normal Conditions

Adverse conditions, due to difficulties with respect to labour, transport, and material, continued during 1919, but much was done in effecting repairs, extensions, and erection of new plant, so that the general state of plant in the works may be said to be resuming the normal conditions of past years.

During the earlier portion of the year, demand was not strong, and much plant was not in operation. This position was utilised at the works to overtake belated repairs and bring up the standard of general efficiency. As the year progressed productive activity increased, and at the end of the year output in some classes of works was approaching the maximum possible with the available plant and raw material, so that the heavy chemical trade may be said to have entered 1920 under favourable conditions. In some directions, however, heavy costs for labour and material led to diminished operations, whilst difficulties in supply of efficient labour and materials greatly delayed repairs in cases where the owners of works were anxious to effect promptly repairs already long deferred.

Complaints were received of alleged emission of noxious gases or vapours from four works, and one complaint was reported by the owners of certain alkali waste heaps which they had received relative to the disposal of drainage from these heaps.

In one case complaint was made against a sulphuric acid works. In this case repairs had been delayed owing to the adverse conditions continued during the armistice and owing to damage caused by a heavy gale undue escape of acid gases occurred. Prompt steps were taken to provide adequate means for dealing with the immediate position and to regain satisfactory working conditions, but, as circumstances permit, further repairs and renewals will be effected to make more permanent structural improvements.

In another case the gases escaping from a plant for concentration of sulphuric acid were the cause of complaint. Gases of this kind at times give rise to complaint even when the limits of acidity fixed by the Act are not exceeded. In this case occasional escapes of undue acidity were observed. The matter was at once dealt with by the owners, who provided additional condensing appliances of an improved type which effected a marked reduction in the acidity of the escaping gases and ample compliance with the requirements of the Act.

The third complaint was also against a plant for the concentration of sulphuric acid. In this case the acidity of the gases

discharged into the air was well within the prescribed limits, but the owner readily responded to a request for further improvement, and additional condensing appliances to suit the particular circumstances were provided, which materially reduced the cause of annoyance.

The fourth complaint was of escape of chlorine. In this case a fan is in use in the bleaching powder plant. Some escape of chlorine occurred owing to the breakdown of this fan. This escape was, however, of temporary duration, and only continued during the time required to put into operation a duplicate fan provided for such a possibility.

A fatality, due to the effect of inhaling noxious gases lurking in a tar still plant after a completed charge had been run off, occurred at the end of the year. In this case a man entered the plant contrary to specific orders and before the still was considered by the management to be in proper condition for entry. Strenuous efforts were made to rescue the victim, and two or three men were gassed in consequence. These recovered subsequently, but their efforts were unsuccessful in removing their comrade in time to permit of his resuscitation.

Alkali and Copper Works

In no case was it necessary to enforce the penalty incurred by emission of an undue proportion of muriatic acid. Early in the year trouble was experienced in one works, in which copper was extracted by the wet process, in maintaining the conditions such that the total chlorides (chiefly composed of muriatic acid) should not exceed the limit prescribed for muriatic acid alone. Improvements were effected in the condensing and draughting arrangements and subsequently better conditions resulted.

The electrolytic methods for production of alkali were further extended during the year and were accompanied by a further contraction in the operation of the old Le Blanc process which has maintained its usefulness since its inception in France at the end of the 18th century. Concurrent with the extension of electrolytic processes the ammonia-soda process was likewise further developed, so that as regards production of alkali the old process has lost much of its importance. The initial stage of the Le Blanc process, in which sulphate of soda in the form of salt-cake and hydrochloric acid are the two products, still fulfils a useful and successful function. It was this stage of the process which led to the first Alkali Act being passed and which still requires the registration of such works as "Alkali" works. The demand for sulphate of soda, in various commercial forms and for hydrochloric acid, was large and widely distributed throughout the country. Thus, although, owing to a policy of concentrated production and from the competition of newer processes, several of the large alkali works in which the full Le Blanc process was in operation, were closed down, a greater number of new works were started in various localities for the production of hydrochloric acid and salt-cake and were registered accordingly as Alkali Works.

Owing to the great reduction in production of high explosives after the completion of the armistice there was a large shrinkage in the quantity of nitre-cake available for utilisation, so that comparatively little was used for the production of salt-cake.

No development in the use of mechanical decomposing furnaces is to be reported. The design of furnace referred to in recent reports, as in operation at one works, continued in operation. Its extension elsewhere is in hand, but owing to difficulties in regard to material and labour, completion of the new plant has been much slower than was hoped for.

The wet copper works suffered from high costs of production arising from high charges for labour and material combined with the utilisation of calcined ore of low copper value: so much so that in several works operations were restricted or entirely stopped. It is to be hoped that this will prove to be a temporary effect due to an abnormal relationship between cost of manufacture and price of products.

Sulphuric Acid Works

The year opened with a period of greatly diminished production in all parts of the country owing to the sudden cessation of the large production of high explosives subsequent to the completion of the armistice in November of 1918, and also in some measure to the disposal of large stocks of acid accumulated to meet the exigencies of war. Many manufacturing plants were laid off work, a few of which were dismantled and thus closed permanently, others were kept in operation but with reduced charges, whilst the remainder were kept in moderate activity throughout the year. During the prolonged period of slackened demand most manufacturers took the opportunity to effect repairs which had been delayed during the previous period of pressure and which had been further delayed by difficulties in commencing and by the slow rate of progress in completing the desired repairs and reconstruction. In the latter part of the year demand gradually increased until in December the manufacture as a whole was in a fair state of activity with, in nearly every works, efficient plant thoroughly overhauled and ready to meet any increasing demands which might arise.

The various types of chamber plants were maintained in good condition, and towards the end of the year were, for the most part, put into operation. The use of those types working with limited chamber space continued to extend. Such are more sensitive to any alteration in working conditions and are more liable to get out of hand, so that careful supervision is called for, not only to comply with Act requirements, but to attain the best practical results. In all cases where the time factor in the chamber process is small, the more thorough method of testing the chamber gases at successive stages of the manufacture and recording the ratio of the acid gases of sulphur and of nitrogen present in the gases entering the absorbing plant is especially desirable.

Messrs. Brotherton & Co. have in operation a plant, the design of which is of special character, and is provided with a shower of acid falling through the chamber gases at successive stages in their progress through the system; hence the expressions "front acid" and "back acid." A record of the composition of the burner gas is of value in all works, and the exhibition in the burner house of the record in graphic form has been found in another work useful in aiding the maintenance of a burner gas of uniform character and of the desired composition. It should be of special value also in those works burning spent oxide from gasworks. In such works disorganisation is apt to occur when a quantity of spent oxide is burned which varies materially from that immediately previously in use. When this occurs the composition of the burner gases is affected at once, and knowledge of this change gives prompt warning of altered conditions which require immediate attention if the best output of acid is to be maintained and loss of available sulphur avoided. It too frequently happens that no warning is received, and the first information comes from testing of the gases passing from the exit of the plant that the chambers have become disorganised, with a consequent interference with production and extra cost to bring back normal conditions.

Ammonia Converters

Oxidation of ammonia as a means of supplying the oxides of nitrogen necessary for the chemical reactions in the chamber process continued to give general satisfaction. This method came into additional use during the year, but in one or two cases difficulty was found in obtaining the best results and in maintaining at a maximum the efficiency of the catalytic material. As indicated last year the dominant consideration is the comparative cost, and if for any reason labour costs are increased, or local circumstances make oxides of nitrogen specially available, the advantage to be derived from oxidation of ammonia to nitric oxide and the like may readily disappear, the more so if any impurity which exerts a prejudicial influence on the contact material be present in the ammonia.

The preliminary iron contact towers referred to in the report for 1918 continued under trial, but no definite quantitative results from continued operation are yet available, nor has the system been brought into wider use, although at one work the necessary tower was completed and on the eve of starting at the end of the year. At the works where most effort has been made to bring it into regular operation the sulphuric acid plant has been always at a disadvantage from insufficient draught, and the increased resistance caused by the additional

tower caused trouble, which was lessened by removal of much of the packing in the tower. A fan will be installed which will be of advantage to the plant generally. Meanwhile, the use of the modified tower has effected the removal of much of the dust carried forward from the burners and has improved the character of the acid made.

Sulphuric acid continued to be manufactured by the utilisation of the sulphurous gas evolved in the calcination of zinc blende preparatory to the extraction of zinc from the calcined ore. The extension of this utilisation of an offensive waste product was not so great as anticipated. The mechanical furnaces, of different designs, erected for the calcination stage have not yet been developed sufficiently to be as reliable for steady continuous work as the best form of hand-worked furnace. Frequent failure of these furnaces led to further delay in putting into operation plant already provided for conversion of the waste gases into sulphuric acid. During the year the most reliable design of furnace was still one operated by manual labour, and the bulk of the acid produced from roasting of blende was in connection with the operation of such furnaces.

The "Kershaw" gravitation oxide furnace was reconstructed. It is now provided with three spiral flues instead of one, and the capacity has been increased fourfold. It was in intermittent use under adverse local conditions as regards draught. It is anticipated that the use of a fan to increase and control the draught will materially improve working results.

The question of the best means for utilisation of chamber space in the ordinary process of sulphuric acid manufacture has been for many years a matter for discussion. The thorough circulation of the chamber gases and the provision of the best conditions for the interaction of vapour of water, sulphurous acid, oxides of nitrogen, and atmospheric oxygen—the four primary contributors towards the progress of the "chamber reaction"—are two important factors influencing the efficiency of the chamber space at command. The size of chambers, shape of chambers, points of connection between chambers, and many other modifications have from time to time been advocated for obtaining a thorough admixture of gases or have led to the development of specially designed systems which are now well known.

Steam Supply

In the usual method of steam supply steam is projected into the chamber from the end of an open steam-pipe under very moderate pressure. In this way a cloud will be formed by the issuing steam, in the centre of which there will be a minimum proportion of sulphurous gas, nitrous gases, and atmospheric oxygen, whilst the vapour of water will be at a maximum, some of which may readily condense and fall as a local deposit of water or of very weak acid. This is not the ideal condition when a proper admixture of all four components is desired and the formation of weak chamber acid is not desired. By using the steam necessary for the chamber reaction to actuate gas injectors placed inside the chamber, extensive movements of the chamber gases will be induced; the steam, instead of forming a comparatively small cloud developed from the end of an open pipe, will be mixed with the chamber gases, which it puts into motion. If any cloud forms, it will be of much greater dimensions and will have no centre rich in moisture with comparatively dry periphery, but be of more or less uniform composition.

Contact Processes

The production of acid by catalytic methods was greatly disturbed during the year. The thorough purification of the acid gases from pyrites burners continued to give much trouble and to interfere with the efficiency of production in some works. This difficulty, combined with a large diminution in the demand for oleum led to a greatly curtailed production of fuming acid. Some oleum plants remained entirely idle throughout the year. In none of these works has electrical deposition plant been used in the treatment of the burner gases. Methods based on electrical action have proved efficient in removing suspended matters in smelting works furnace gases, and although not essential in the case of works making oleum from pyrites sulphur, the practice on the Continent of Europe and in America points to the advantage of adapting such methods for the purposes of the manufacturer producing acid by the contact method from pyrites.

(To be concluded.)

Canadian Cyanide: Its Manufacture and Utilisation

By Dr. W. S. Landis

(Of the American Cyanamide Co.)

Up to 1917 there were only two well-defined and developed processes for the production of alkali cyanides. The most important of these is the Castner process, in which the raw materials used consist of metallic sodium, ammonia and wood charcoal. The reaction takes place in three stages, in the first of which dry ammonia gas is conducted over metallic sodium to form soda amide. The soda amide is next heated with charcoal to form sodium cyanamide. Sodium cyanamide if again heated with additional charcoal to form sodium cyanide. The resulting product is obtained in a melted form and of a commercial purity averaging 96-98 per cent. for the higher grade products. Metallic sodium is made by the electrolysis of caustic soda or of sodium chloride. It is a comparatively expensive reagent, and at the present state of development of the art there is comparatively little opportunity offered for any material cheapening of the sodium. Ammonia is obtained in the form of a fairly pure solution in water, either from coke ovens, gas plants or cyanamide works. Its price to-day is very high, owing to certain economic conditions now existing, but, perhaps, in the future there is a possibility of obtaining cheaper ammonia than at the present time. Nevertheless, even at the lowest price at which ammonia has been sold, it may be looked upon as an expensive reagent. This process has never been installed in Canada, but has furnished much of the product used in the Dominion from representative plants in either Great Britain, the United States or Germany.

The second commercial process uses as its raw material the vinasse produced as a residue in beet sugar manufacture. By distilling this material and treating the vapours obtained, hydrocyanic acid is produced, which can be absorbed in caustic soda solution and the cyanide recovered therefrom. The process is complex and requires very exacting chemical control. The recovery of cyanide from solutions is a very difficult manufacturing problem, and as a result its operation has never been developed outside Germany, and it only competes in a small measure with production by the Castner process.

Before 1917 Canada never played any part in the production of a reagent which the precious metal industry of the Dominion consumed in large quantities, but had been entirely dependent upon importation. The processes hitherto employed had either used expensive raw materials or had been complicated in character, and the price of cyanide to the Canadian consumer had of necessity been fairly high.

The recent war seriously affected the supply of cyanide to a great many mining districts. The production of the large German plants was excluded from commerce. The great demands for electric power, caustic soda and ammonia, occasioned by the manufacture of munitions, interfered greatly with the production of some of the other plants outside Germany. As a result, in the fall of 1916 the price of cyanide began to mount to almost unbelievable figures. The visible supply almost disappeared.

Development of Canadian-Made Cyanide

It had been known for many years that calcium cyanamide could be transformed into cyanide, but no commercially workable process had been developed in the fifteen years intervening since this fact had first been discovered in the laboratory. Serious attempts had been made at the development, but the difficulties of inefficient transformation, of costly furnace operation and maintenance, and, finally, of the utilisation of a product containing only a low percentage of cyanide, all had prevented this transformation from becoming a commercial possibility.

In the fall of 1916 the cyanide situation became so acute that a large mining corporation with headquarters in the United States interested the American Cyanamide Co. in undertaking serious development work at the Cyanamide plant at Niagara Falls, Canada, with the object of devising a process of producing cyanide from cyanamide. The problem had been comprehensively studied some years before, the officials of the Cyanamide Company having visited the principal plants abroad where work of this nature had been done, and had there familiarised themselves with the difficulties involved in making

this transformation. They found no operating plants or processes that could be given consideration, and were practically forced to start with the very fundamentals of the process. Plans were completed for an experimental installation at Niagara Falls, Canada, and the first units were put into operation about January 1, 1917.

Cyanamide is a nitrogenous material containing calcium cyanamide, CaCN_2 ; calcium oxide, CaO ; graphitic carbon, C ; and various minor impurities obtained from the raw materials used in its production. Its principal use has been in the fertiliser industry, where the nitrogen of the cyanamide, through soil transformation, becomes available for feeding crops, and is therefore competitive with other nitrogenous fertiliser materials. It is one of the cheapest sources of combined nitrogen known, and from the fact of its cheapness it offers an admirable material for transformation into cyanide.

Process Used at Niagara Falls

The process, as ultimately worked out, involves mixing cyanamide and common salt together and melting the mixture in a peculiar type of single-phase electric furnace. The operation is continuous and largely mechanical, and the power requirements for this melting process are very moderate. Temperatures are not high, and wear and tear on the apparatus is not excessive.

The furnace is tapped continuously, and the molten product runs to a cooling device which instantly chills it in the form of thin flat flakes of a dark grey to glossy black colour and extremely brittle. These flakes are packed into caustic soda drums and shipped to the consumer.

In the early experimental work it was hoped to obtain a product containing about 12 per cent. equivalent sodium cyanide content, the remainder being lime, common salt and miscellaneous minor impurities. The first experimental processes, which operated on the batch principle, amply met expectations both as to quality and output. As developments proceeded and more was learned of the characteristics of the product, the quality improved, and by the end of 1917 a product was being turned out containing about 22 per cent. of equivalent sodium cyanide to the extent of about four tons of sodium cyanide (calculated as 100 per cent.) per day. In 1918 the developments were continued, and the batch furnace was abandoned for a continuous type, and by the end of that year was producing a material containing approximately 30 per cent. equivalent sodium cyanide.

In July, 1919, after a temporary shutdown of the operation, developments were again taken up in a serious attempt to improve the quality of the product and cheapen its cost of manufacture. These developments were the most remarkable of all attempted, and within a few weeks a product of very uniform quality was being produced, averaging between 36 and 37 per cent. equivalent sodium cyanide. The demands for the material increased so enormously, owing to the improved quality of this product and the increased uses found for it, that experimental work was suspended for a short time to catch up with the orders on hand. It was later taken up, and towards the end of the year 1919 the quality of product was again improved, and several hundred tons of material, running about 46 per cent. equivalent sodium cyanide, being produced.

The demands for these improved products—the 36 per cent. grade being known as Aero Brand Cyanide Grade X, and the product above 45 per cent. known as Aero Brand Cyanide Grade XX—have recently become so great that additional equipment is now going into operation in the plant at Niagara Falls, to assist in meeting a demand of nearly thirty million pounds of sodium cyanide (calculated as 100 per cent.) for the year 1920.

Properties of Canadian-Made Cyanide

The product consists of a dark grey to black shiny material in the form of thin scales, varying from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch in thickness, and from $\frac{1}{4}$ to $\frac{1}{2}$ square inch in area. The old system of designating this material in expressing its content of available cyanogen in the form of either potassium cyanide or

sodium cyanide has been preserved. Future developments will undoubtedly allow the production of a still more concentrated cyanide, and we hopefully anticipate being in a position to supply a product containing over 50 per cent. equivalent sodium cyanide by the time the demand for that grade arises. Both grades are sold on basis of contained equivalent of sodium cyanide.

Besides the available cyanogen the product also contains free lime, sodium chloride, and various impurities in small amounts, such as cyanamide, miscellaneous calcium compounds, and such impurities as are picked up in the ash of the coke used in the cyanamid process. The sum total of these various miscellaneous compounds is only a few per cent., and none of them has ever caused any deleterious action in the proper usage of the material.

Aero Brand Cyanide, like all other cyanides, undergoes decomposition on contact with moist air, carbon dioxide and water. It is therefore packed in tight metal containers, for which purpose the ordinary iron caustic soda drum is used. The standard package contains about 375 pounds, and is marked to show the character of its contents and the grade of the material contained therein. If kept tightly closed the contents keep indefinitely, but if moisture is permitted to enter the drum, or the material is exposed in a pile to the air, decomposition will occur and a loss of cyanide will be noted. The flakey nature, that is, the large exposed surfaces of the product, show the effect of such exposure to a greater extent than the ordinary flat slabs of the usual and higher grade cyanides found on the market.

Aero Brand Cyanide when dumped into water dissolves readily in so far as its soluble constituents are concerned. Care must be taken thoroughly to agitate during solution, as otherwise the flakes will sink to the bottom of a dissolving tank. The lime present will hydrate with a considerable local evolution of heat, and the mass of damp flakes will then decompose, owing to the high temperature in the presence of moisture, and the wet mass will give off ammonia with consequent loss of cyanogen. It is therefore necessary in dissolving this material in mill solutions that agitation be thorough, and all settlement and accumulation be prevented. If this precaution is taken, very quick solution of the soluble contents follow, without loss of cyanide.

Cyanamide contains a small amount of calcium carbide. At times additional carbide in very small amounts is added to the cyanide furnace. As a result, Aero Brand Cyanide contains upwards of 1 per cent. of calcium carbide and when thrown into solution evolves acetylene gas. The quantity of gas evolved is quite small and no difficulty has been experienced from handling it, but its odour is quite noticeable. It is, however, a non-poisonous gas and little attention need be paid to its odour. It is recommended, however, that ventilation of the mill buildings be so provided that this gas can be carried out of the building and not permitted to accumulate there to any marked degree.

In handling Aero Brand Cyanide in mills, the usual practice is to cut out the top of the drum, which can easily be done, as the metal is very soft. This can is then dumped into the mill circuit. Reports have been circulated throughout the mining regions to the effect that the opening of these cans was a hazardous operation, as they evolved very poisonous gases. No fatalities, so far as known, have ever occurred in the handling of these drums, although there are customers who have used thousands of tons of the material in the three years of its manufacture, and there has been quite freely placed at our disposal undisputed evidence contradicting the malicious reports.

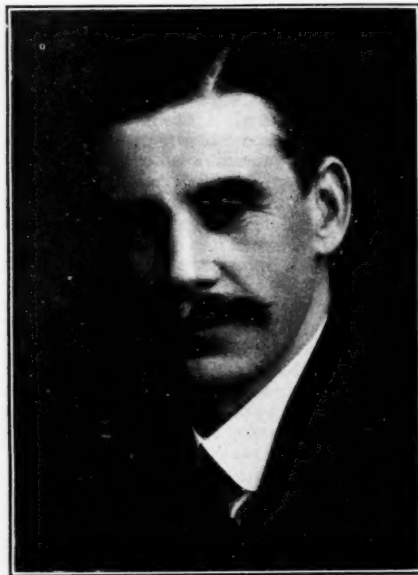
As mentioned above, the soluble constituents of Aero Brand Cyanide dissolve very readily in water, but there is a certain amount of insoluble material consisting of lime, graphitic carbon residue and various minor impurities that will not go into solution. It was anticipated that this carbonaceous residue might give trouble in the mill circuit causing precipitation of the precious metals. In the first few months of the use of Aero Brand Cyanide this insoluble residue was filtered out and only clear solutions fed to the treatment tanks. It was quickly learned, however, that the residue did not have any precipitating effect on the precious metals in the solution, and the practice of filtration was therefore abandoned. The present universal procedure is to dump the cyanide directly into the agitation tanks or at any other suitable place in the

mill circuit without special filtration. It, however, must not be dumped into the pregnant mill solution as the calcium carbide it contains evolves acetylene on contact with water and acetylene will precipitate gold and silver. Since this gas is instantly set free on touching water and no trace remains in solution where a thorough agitation exists, no difficulties whatever are experienced from this source, provided the addition has not been made to a solution carrying appreciable quantities of gold and silver.

Mr. J. A. Reavell

The New Chairman of the Chemical Engineering Group

MR. J. A. REAVELL, the new Chairman of the Chemical Engineering Group of the Society of Chemical Industry, was born in Alnwick, Northumberland. He had the usual public school education, followed by training as a mechanical engineer. For many years he was European manager of an American com-



pany which had offices and works in all the chief countries of Europe. He also had considerable American experience. Mr. Reavell then started in association with M. Paul Kestner to develop the Kestner patents and acted as managing director to the Kestner Evaporator & Engineering Co., Ltd., chemical engineers, who control the whole of the Kestner patents for Great Britain and her Colonies. The whole of the development of this business has been carried out by Mr. Reavell, who has also taken out a number of important patents.

Determination of HCN

IN a paper read recently by Mr. R. Leitch-Morris before the British Pharmaceutical Society, a number of volumetric processes for the determination of HCN are discussed. In reference to Liebig's original process, Mr. Morris states it to be quite satisfactory in a general way, but there are several sources of error. These he deals with in detail.

Then follows the method of Fordos and Gelis, which is somewhat troublesome for HCN, but is a useful process for determining the (CN) in Hg(CN).

Volhard's method is only useful in special cases. It is highly accurate, but the necessary filtration of the silver cyanide before the excess of silver can be determined makes the process tedious.

A considerable portion of the paper is devoted to a modification of Liebig's method, introduced by Dénigès, in which the use of KI as an indicator is suggested in strongly alkaline solutions. It is claimed that in this manner the end point is sharply and quickly determined.

National Conference on Trade and Taxation

To the Editor of THE CHEMICAL AGE.

SIR,—Recent discussions in the House of Commons upon the Budget proposals revealed clearly that commercial interests are being seriously prejudiced through want of cohesion of forces and through lack of unity in criticism and suggestion. It is now quite evident that, unless some attempt is made forthwith to organise for common and united action, the Chancellor of the Exchequer will still be able to point to want of uniformity in the attitude of different sections of trade and commercial associations, and the invidious and inequitable burdens now applying will be perpetuated. The Executive Council of the Chemical and Dyestuff Traders' Association authorise me to suggest that a National Conference, consisting of representatives from the various trade and commercial associations, chambers of commerce and other kindred bodies in the United Kingdom should be convened at an early date with a view to considering the position and prospects regarding national finances, and to the possibility of formulating a definite policy and deciding upon united action.

Trade and commerce can always be relied upon to discharge its full and proper share of obligations to the State; but Britain's position of supremacy amongst the great commercial countries of the world will be seriously jeopardised if the present oppressive and inequitable proportion of the burden of taxation continues to be placed upon one section of the community. It is surely unwise in the national interest that the trade of the country should be handicapped and fettered as compared with the position of foreign competitors.

There is the further aspect that the present and prospective total national expenditure should be fully justified, and the possibilities of economy and retrenchment fully investigated from a practical business standpoint.

If this suggestion meets with approval, perhaps some of the other associations concerned will join with our association in making arrangements for summoning a Conference, to be held in London in the early autumn.—Yours, &c.,

22, Buckingham Gate, FREDK. T. T. REYNOLDS.
London, S.W.1, Chairman of the Executive Council of
July 28, 1920. The Chemical and Dyestuff
Traders' Association.

Catalogues, etc., for Riga

To the Editor of THE CHEMICAL AGE.

SIR,—I beg to inform you that H.M. Consul at Riga (Mr. E. F. Cable) has reported to this Department that he intends establishing at the Consulate a collection of British catalogues and trade journals for inspection by callers, and distribution among local traders.

United Kingdom firms who are interested in the matter are accordingly invited to forward a copy of any catalogues or other trade literature (in English or German) they have issued and, if desired, small samples of their products, direct to H.M. Consul, British Consulate, Riga, for inclusion in the collection.—Yours, &c.,

Department of Overseas Trade, L. N. BARKER,
(Development and Intelligence), For Comptroller-
35, Old Queen Street, S.W., General.
July 22.

Neutral Sulphate of Ammonia

To the Editor of THE CHEMICAL AGE.

SIR,—With reference to the letter of Mr. G. S. Pitt, published in THE CHEMICAL AGE of July 24, I should be glad if you would allow me to state that we are not manufacturing Neutral S/Ammonia under the patent mentioned by him, but by the South Metropolitan Process, patents Nos. 141,819 and 141,798, the plant being put in by C. & W. Walker, Ltd., of Donnington, Salop.—Yours, &c.,

Corporation of Stafford Gas Works, W. M. VALON.
Stafford, July 24.

Zinc Paints

Official Recognition in America

IN view of our notice of Mr. A. H. Sabin's book on white-lead, this week, the following announcement from the *Canadian Chemical Journal* is significant.

"Standard Paint Specifications under which the United States Government is recommended hereafter to purchase paints for the use of the Army, Navy and other departments have been determined upon by the Inter-Departmental Committee for the Standardisation of Paint Specifications. The decision resulted from months of investigation and tests." The importance of zinc oxide in increasing proportions is recognised by paint technologists on the Committee. The pigment proportions of the specifications follow:—

	Minimum Percentage.	Maximum Percentage.
Zinc Oxide	30	55
Lead (Total, including either one or mixture of carbonate and sulphate)	45	70
Inerts and colours	0	15

Of particular interest to paint manufacturers and users is the high proportion of zinc oxide introduced into the Government formula. This is regarded as one of the most sweeping official acknowledgements of this pigment's utility in paint yet recorded. Less than ten years ago, except in the Navy and the lighthouse service, no zinc oxide was included in paints used by the Government. Zinc oxide now composes 60 per cent. of the pigment of Battleship grey paint that covers battleships and other U.S. Naval craft.

American-produced zinc oxide, however, has helped to paint the British Navy for 50 years: while France has been an exponent of zinc in paint for a long period, it was not until technical experts urged a mixture of zinc oxide in paint that Washington took official notice of it.

Now, the Capitol Dome is covered with paint containing zinc so that rust may be deterred; army cantonments are clothed with zinc paint, both inside and out, and during the war zinc paint aided in camouflaging the big field guns in France as well as transports and battleships.

Recognition of zinc's efficiency has been a factor in the greatly increased popularity of ready-mixed paints. The durability of such paints make their use economical and they possess other advantageous qualities that commend them to users.

High-grade, ready-mixed paints include varying proportions of zinc oxide which range from 30 to 55 per cent. The liberal limits allowed by the Inter-Departmental Committee, however, insure the zinc portion being close to the higher figure inasmuch as zinc possesses great oil absorption properties and gives paint increased covering power. Zinc paint also possesses colour constancy; it has a tough hard film.

It is interesting to know that all modern mill whites are now made exclusively of zinc oxide and lithopone; no lead is used. This is in direct contrast with the practice a few years ago. The advantage claimed is that paint holds its colour longer, is cheaper and covers greater surface.

Institute of Chemistry Passes

THE following candidates were successful in the July examinations of the Institute of Chemistry recently held London, Manchester, and Glasgow:—

For the Fellowship.—In the branch of metallurgical chemistry: A. C. Melville; in the branch of the chemical technology of textiles: G. E. Knowles.

For the Associateship.—In the branch of mineral chemistry: E. A. Morris; in the branch of metallurgical chemistry: C. Hollingsworth; in the branch of organic chemistry: L. V. Cocks and R. G. M. Dakers; in the branch of the chemistry of food and drugs, &c.: S. Greenberg, Vera Newcombe, and H. C. M. Winch; in the branch of the chemical technology of coal tar dyestuffs: A. Potter.

The following Associates have passed the examination for the fellowship and will be entitled to apply for election to the Fellowship on the completion of three years' registration as Associates: In the branch of agricultural chemistry: G. G. Auchinleck and H. C. S. de Whalley.

De-watering of Sewage Sludge

The Birmingham Method

MR. F. R. O'SHAUGHNESSY, hon. secretary of the Midland and Birmingham Section of the Society of Chemical Industry, and consulting chemist to the Birmingham Tame and Rea District Drainage Board, made an interesting contribution on Thursday, July 22, on the Dewatering of Sewage Sludge, with special reference to the Birmingham method, before the members of the Royal Sanitary Institute, who met in congress at the University of Birmingham. Mr. W. E. Riley presided, and a number of chemical and other engineers were present.

Mr. O'Shaughnessy pointed out that as the result of the great amount of work done in recent years the purification of sewage liquor could be accomplished satisfactorily in various ways; but, on the other hand, the sludge problem still remained troublesome and formidable. Except in those few cases where the whole sewage could be passed direct to the sea or other large mass of water, the sewage problem was essentially a de-watering problem. Generally, the bulk of the water—say, 99.95 per cent.—was removed quite readily in sedimentation tanks from the solids which went to form most of the sludge, and it was the elimination of this last small proportion of water (which with the solids formed a slurry containing about 90 per cent. of water) which furnished the difficulty.

The problem was difficult because of two outstanding properties of the sludge—viz., (1) It was offensive, which made it difficult to handle; (2) it was a complex aqueous colloid, consisting of colloid foams, emulsoids, and suspensoids, which retained water with great tenacity owing to the presence of oils, soaps and gelatinous bodies, which conferred considerable stability on the complex. There were but two agencies capable of breaking up this complex and also destroying its offensive character—viz., (a) heat and or (b) biological decomposition. The first was ruled out because of expense, and there remained only the second, which was the agent exploited in the process under discussion.

Principle of the Process

It had long been noted that generally when the so-called 'septic action' had become well established in a septic tank, or an old cesspool, the contents became covered with a thick crust, and the fermentation proceeded in the tank without nuisance. The new tank established in Birmingham was constructed so that concentrated sludge could be made to behave in a similar fashion. This was a point of great importance in practice, and differentiated the Birmingham method from the septic tank process and the methods of Travis and Imhoff, for in these latter the crude sludge entered the digestion chamber in very small increments. In the Birmingham sludge digestion process the digestion chamber was entirely separate from the sedimentation tank in which the crude sludge was collected, and when being charged from the latter tank the digestion chamber would receive a dose of several hundreds of tons of crude sludge (containing about 90 per cent. or so of water) in a few hours.

This was the principle of the process by which with proper safeguards and attention to details, sludge could be made to undergo vigorous fermentation without causing nuisance, and ultimately become a black, inoffensive, mobile sludge, which had profoundly altered its physical characteristics so that it would part with its aqueous content fairly freely as compared with the original crude sludge. Usually this end product was pumped on to prepared plots about $\frac{1}{2}$ acre in area, which are levelled, drained and covered with several inches of ashes for the reception of about 18 in. of the sludge. By drainage and by evaporation the water escapes, leaving a firm inodorous peat-like solid about 6 in. thick, which is lifted and carried to the tip.

The crude sludge is collected in five huge tanks of 1,000,000 gallons capacity each, and these are cleaned out usually about once a week. Under these conditions the water content of the resulting crude sludge is computed to be 92.5 per cent., and the average amount about 1,000 tons per day (or 75 tons of dry solid matter per day). The sludge digestion plant has a total estimated capacity of 28,250,000 gallons, and in all gives to the sludge a digestion period of from four to five months on the average. This plant consists of thirty-nine chambers, five of which (capacity, 9,350,000 gallons) are used for the finishing operations. When about to empty a sedimentation tank of its crude sludge, a block of digestion tanks (usually five in number) is partially pumped down to give sufficient space for the incoming charge of crude sludge. When it is thought desirable to inoculate thoroughly the crude sludge with active fer-

menting material (as in the colder months of the year) such material is drawn on by a small pump and delivered into the main, carrying the crude sludge to the digestion tanks. Also "live" steam is delivered direct to the sludge main during the very cold weather to raise the temperature of the sludge, and thus promote digestion.

As digestion of the sludge proceeds the colloid complex is steadily broken up and separation of water from the solids occurs. This water is drawn off at convenient intervals from time to time.

The rate of destruction of the sludge is at first rapid when fermentation is vigorous, but also diminishes rapidly. After a couple of months the rate becomes excessively slow. The sludge, however, is still very colloidal in character, and will not part readily with the water present. It is both interesting and important to note that the major portion of the time required to bring the sludge into a fit condition to put on the drying beds is taken up chiefly, not with destructive fermentation of the sludge, but apparently with the change in the physical condition of the sludge from a highly complex colloidal state, to a more simple and practically a non-colloidal state which parts with its aqueous contents with relative ease.

Action Interrupted by Tar, etc.

With an industrial sewage such as that from the Birmingham district, many substances find their way into the sewage which are inimical to bacterial life. Of these tar is the most troublesome, and it occasionally is sent down in such quantity that the digestion process is seriously hampered, as the tar becomes incorporated with the crude sludge.

Very great care and often special means are required to restore the action which has been poisoned in this way. In the colder months resort is made to inoculating the crude sludge by drawing with a small pump on fermenting sludge from one of the active tanks in the installation, but this mixing operation, as it is called, cannot be carried on indefinitely, for, after a time, if it is persisted in, the fermentation loses vigour, and the action falls off. This phenomenon is a very curious one, and the cause of it somewhat problematical. Possibly it is due to loss of vigour on the part of the organisms responsible for the fermentation. When, owing to poisoning or other causes, the process flags, steps are taken to introduce new and vigorous organisms to the system, and the active fermentation is thereby restored. It will be seen, therefore, that constant watchful care is necessary to keep the action going satisfactorily.

Mr. J. D. Watson, who is a great authority on sewage disposal (having advised many of the large cities of the Empire as well as American), warmly congratulated Mr. O'Shaughnessy upon his contribution. In a great inland city or town the de-watering process was undoubtedly the best method so far, although research work by scientific men like Mr. O'Shaughnessy might lead to further progress.

Ramsay Memorial Fund

THE Ramsay Memorial Fellowship trustees have elected Mr. W. Davies, M.Sc. (Manchester), at present working in the chemistry laboratories of the University of Oxford, to a Ramsay Memorial Fellowship. This election is the first election to a Ramsay Memorial Fellowship provided from the Ramsay General Fund. The Ramsay Memorial Executive Committee have decided to close the general fund. The total amount received up to date is £53,402 7s. 1d., this sum being exclusive of the fellowships founded by the Dominion and foreign Governments, the capital value of which is estimated at about £30,000. Although the general fund is closed, contributions sent in forthwith to the treasurers, Lord Glenconner and Professor J. Norman Collie, at University College, London, can still be included in the complete list of subscribers which is now being prepared.

Commercial Alcohol for Motor Fuel

A resolution calling upon the Government to carry out the recommendations of the FUEL RESEARCH BOARD on gas standards and to remove the restrictions hampering the manufacture of commercial alcohol for motor fuel was unanimously adopted by a meeting of the Automobile Association in Edinburgh last Tuesday. It was resolved to ask the Edinburgh and Leith Corporations Gas Commission to restore the provision for the manufacture at the joint gasworks of benzol. The process was successfully carried out there during the war, but was afterwards discontinued.

W. J. Bush & Co.

Record Profits

MR. J. M. BUSH, who presided at the twenty-third annual meeting in London on Thursday, July 22, said that in the early part of last year the company's turnover fell considerably owing in a large measure to the cessation of war work, but later on a brisk demand arose for their manufactures, and the capacity of their plant was taxed to the utmost. "In many cases (the chairman said), 'prices of both raw materials and manufactured products reached very high figures and we were able to dispose of our large stocks to exceptional advantage. As a result of these conditions both our gross and net profits are the largest in the history of the business. This is the more noteworthy as our expenses were much greater, especially in respect to wages, salaries, and bonuses, which were nearly £20,000 above the previous year. It was not to be expected that these abnormal conditions would continue, and at the present moment the reverse process of diminishing sales and declining values is making itself manifest.'"

The Budget and the Essence Trade

"AT our last annual meeting I referred to the increase in the duty on spirits imposed by the Budget of 1918 and the consequent disadvantageous position of British essence manufacturers as compared with their competitors in other countries. I mentioned especially the protection given to foreign manufacturers in respect to ethyl compounds, which have to be manufactured in this country from duty-paid spirit and on which no drawback is payable when exported. Our Government, which boasts in the House of Commons of its fostering care of national industries, cannot be said to have done any fostering in recent years in respect to the essence trade. On the contrary, the increase of 22s. 6d. per proof gallon in this year's Budget is another serious blow to the industry. In the year 1914 a puncheon of 120 gallons of spirit cost us £162, whereas to-day it costs £790. As we buy many such puncheons weekly it is obvious that a great absorption of capital has taken place in carrying on our business. In my opinion it is extremely doubtful whether the Government will obtain any increased revenue from the essence industry through the higher duty. There is, in fact, grave danger that it will gradually lead to the employment of substitutes for spirituous essences and a resulting loss to the national revenue. The British Essence Manufacturers' Association and the Perfumery Section of the London Chamber of Commerce are again urging the Government to give some form of relief, and particularly in such directions as will diminish the absorption of capital which I have just mentioned. The principle of a differentiation of duty between alcohol used for industrial purposes and that for potable liquors has already been recognised in the case of medicinal preparations, the object, no doubt, being in part to prevent the abuse of the latter through a prohibitive price. The duty is 14s. 9d. per proof gallon in the case of medicinal preparations, as against 74s. for essences. If this danger is great with regard to the consumption of medicinal preparations it is equally great in respect to other commodities."

"In other departments of our business, particularly in the direction of the manufacture of synthetic perfumes, drugs, and some intermediates used in the coal-tar dye industry we have made satisfactory progress, and we look to an increasing return in the future from this work."

A final dividend of 10 per cent. on the ordinary shares was declared.

Dangerous Drugs Bill

THE DANGEROUS DRUGS BILL, which has been prepared as an outcome of the International Opium Conventions, passed the Committee stage of the House of Commons on Tuesday. The Bill deals with the restrictions to be made in regard to the importation and exportation of opium, cocaine, morphine, and other dangerous drugs, and provides for heavy penalties against persons guilty of an offence under the Act. Dr. Murray (Western Isles) expressed regret that the Bill did not apply to India and our Eastern Dependencies, in order to cover the terrible opium trade in the East. It affected our moral prestige in the East, and he hoped the Government would take this into consideration when the Bill came before the House.

Empire Oil Resources

Mr. Kellaway on our Policy

VISCOUNT COWDRAY presided on Monday over a luncheon given to Mr. Kellaway, Minister in charge of petroleum affairs, by the directors of the petroleum companies exhibiting at the Crystal Palace Exhibition (oil section).

Replying to the toast of the Government, coupled with his own name, Mr. Kellaway said the present was in very truth an oil age, and even to-day there were 70,000 tons of oil provided as bunker fuel every month at United Kingdom ports. His advisers told him that in ten years' time, at a conservative estimate, 75 per cent. of the merchant ships sailing under our flag would be burning oil fuel. Another example of the growing importance of oil was to be found in the increase in the use of motor vehicles. Altogether the British Empire used 6,000,000 tons of oil every year, but it produced only 2,000,000 tons, and that was a state of things which he believed to be inconsistent with our national safety. (Hear, hear.) Germany realised this by the concentrated attacks she made during the war on sea-borne supplies of oil coming to this country. Sixty-six tank vessels were sunk by enemy action, and 295,000 tons of oil were lost. He asked Americans to realise the significance of facts like these, and, when they were judging the oil policy of the British Empire, to ask themselves what attitude they would feel compelled to adopt if the situation were reversed. It had been alleged that the British Empire was excluding outsiders from any share in oil production within its boundaries, but that was not true, for even in this country American capital was interested in at least one great enterprise which was concerned with the discovery of oil. But, while the open-door policy was safe and possible for a country which controlled 80 per cent. of the oil supplies of the world, that policy was not safe, nor was it possible, for an Empire which controlled less than 5 per cent. (Cheers.)

Stock Exchange and Scientific Truth

A great deal of anxiety had been caused amongst reasonable Americans by certain wild statements which had been made by men professing to speak with authority, but he would ask Americans to treat these statements as statements made by men who had been more concerned with Stock Exchange transactions than with scientific truth. It was obvious that the United States must control the oil supplies of the world for very many years to come, and any American putting himself in the position of the British Empire would have said that our Government had been criminally negligent if it had not taken every step possible to safeguard the oil supplies of this country. (Cheers.) Complaints had been made of the Government's delay in announcing further details of its oil policy, but when issues of such importance were involved it was perhaps as well to make haste slowly. Personally, he regretted that the House of Commons threw out that clause in the first Petroleum Bill which would have enabled them to pay a royalty of 9d. per ton for any oil found here. It was more important to get oil in this country than to haggle about the means by which they were to get it. (Hear, hear.) He believed in English oil. The Hardstoft well had up to date yielded 116,000 imperial gallons, and was now producing a ton a day. He hoped shortly to be able to announce the Government's policy. Two companies, in addition to the organisation controlled by Lord Cowdray, had now received licences to bore. Coming to the question of the oil in Mesopotamia, he said that the Anglo-French agreement was based, so far as it affected Palestine and Mesopotamia, on the principle that the concessions granted by the old Turkish Government must be honoured. Under these provisions the interests of the United States in Palestine were safeguarded in the same way as the interests of this country and France and Mesopotamia. Like all thoroughly sound agreements, our contract with France must proceed on lines of justice and mutual good faith. The policy which the Government, through his Department, would adopt would depend on the form of Government ultimately set up by Turkey. In his own view, the worst possible way of developing the oil resources of Mesopotamia was by direct Government action. The qualities required—audacity, rapid decision, and willingness to take risks—were not attributes of Government methods. He looked forward to seeing an Imperial Oil Conference set up in the near future.

A White Lead Prosecution

Summonses under the Merchandise Marks Act

At the Mansion House Police Court, on Tuesday, Archibald Eadie & Co., Ltd., 54, Cook Street, Glasgow, appeared to answer summonses under the Merchandise Marks Act, which had been issued on the information of Mr. Hedley Miller, secretary of the White Lead Corroders Section of the London Chamber of Commerce. The summonses charged the defendants with selling a substance to which a false trade description had been applied, and with applying a false trade description to goods. The defendants pleaded guilty to the two summonses which charged them with selling the goods.

Mr. Lawton, for the London Chamber of Commerce, said it appeared that F. Cottrell, Ltd., of Crouch Hill, Crouch End, N., had contracted to do work for the London County Council, including painting, and they required a quantity of white lead. Genuine white lead was specified by the London County Council, and Messrs. Cottrell got into communication with E. Thornton & Co., Ltd. Through that firm they placed an order with the defendants for one ton of genuine white lead. The order was confirmed by the defendants as an order for genuine white lead, and in due course four casks, each containing 5 cwt., were received. The casks were each stencilled "Genuine white lead." The first order was given on March 9, and a second order was placed by Messrs. Cottrell on March 22. The second order was also invoiced as genuine white lead, and the four casks were similarly stencilled. When the casks were opened and examined by Messrs. Cottrell it was found that the substance did not resemble white lead. They took advantage of the facilities afforded by the London Chamber of Commerce and sent samples for analysis. As a result of the analysis Thornton & Co. were communicated with. Counsel thought it was only right to say that so far as Messrs. Thornton were concerned they were only agents and had not been guilty of any offence under the Act. They were perfectly innocent intermediaries. The first analysis obtained by the London Chamber of Commerce showed that instead of the substance being genuine white lead, it contained 14.6 per cent. of sulphate of baryta, 1 per cent. of sulphate of lead, and 2 per cent. of oxide of zinc. The remaining 84.2 per cent. was genuine white lead. The second sample proved on analysis to contain 27.5 per cent. of sulphate of lead and 1 per cent. of oxide of zinc, the remaining 71.5 per cent. being genuine white lead. There were three adulterations found in the two samples. On receipt of the analysis the matter was taken up with the defendants and they intimated their intention of pleading guilty.

Counsel went on to say that white lead was still manufactured by the method by which it was produced in the first year of our Lord more than 1900 years ago. The present method of manufacture was described by Pliny in his natural history book, which was published in A.D. 1. Sulphate of lead was of comparatively modern origin. It was not satisfactory from the point of view of painting, and was not anything like so good a pigment as white lead. It had also to be remembered that sulphate of lead was £10 a ton cheaper than genuine white lead. The Chamber of Commerce felt that it was in the public interests that the prosecution should be undertaken. It was desirable that the provisions of the Merchandise Marks Act should be enforced, and particularly in the present day when prices were so high. The Chamber did not press for a severe penalty. The defendants were an old-established firm and might have made a mistake.

Statement by the Defendants

On behalf of the defendants, Mr. Muskett said that they recognised that the case had properly been brought before the Court. Long before any proceedings were begun the defendants stated that if any action was necessary at no stage would there be any contest and that a plea of guilty would be entered. The case was a particularly unfortunate one for the defendants. They were an old-established firm and had been in existence since 1845. That was the first blot of any kind on their excellent record. The defendants were a limited company, and were very large manufacturers of all kinds of paints, including white lead, red lead, varnishes and greases, and they had a very large and valuable connection in the trade. They extremely regretted that the present matter should have arisen. With regard to the baryta which should

not be in genuine white lead, the defendants had ascertained, although they took the responsibility, that the presence of that ingredient was due to careless workmanship in one department. The foreman responsible had been suitably dealt with. So far as the sulphate of lead was concerned, different considerations arose. It had been said that sulphate of lead was a much cheaper material than carbonate of lead, which, when worked up, constituted white lead. His instructions were that sulphate of lead cost the defendants £1 a ton more than carbonate of lead. He mentioned that fact to dispel any suggestion that there had been any notion of fraudulent trading or dealing in the matter. Sulphate of lead was largely used in the composition of other paints and there was nothing improper in the defendants being in possession of large quantities of that substance. He could, if necessary, have proved that the price of the one substance hardly differed from that of the other, and therefore he hoped that any idea of fraud would be dispelled. During the war there had been, and still was, the greatest possible difficulty in obtaining from the corroders who supplied the basic carbonate of lead sufficient quantities of that substance for the trade. That state of affairs was as acute at the present moment as it had been during the past few years. He added that the defendants did what they could when the matter was brought to their notice and offered to replace the goods supplied. There would be no further complaints of the kind before the Court, and having regard to the record of the defendants and the moderate way in which the prosecution had been put, he suggested that an award should be made to cover the costs. The matter was a serious one for the company in their trade relations.

The Lord Mayor said he could impose a fine of £20, but he would only fine the defendants £5 in each case, together with five guineas costs.

In answer to a question, it was stated that the remaining two summonses would be withdrawn.

Testing Laboratory Glassware

THE Glass Research Committee of the Institute of Chemistry have prepared a scheme for testing laboratory glassware, which is recommended to the notice of manufacturers and users. The object of the tests is to characterise such chemical glassware as may safely be considered "resistance" glass. The tests are the minimum which such glass ought to answer, many brands of chemical glassware being available which will pass much more stringent tests. No attempt is made to distinguish between different makes of "resistance" glass, neither are the tests intended to ascertain the extreme limit of resistance to which glass can be carried. For the latter purpose other methods are available which have been proposed from time to time in the literature on the subject. For the protection of the user, however, the tests described afford a simple means of ascertaining whether glass has any claim to be considered of "resistance" quality for ordinary chemical operations. For special purposes—toxicological and other—the user is of necessity compelled to make his own tests for the specific purpose under consideration. Thus certain glasses, of good quality in other respects, contain arsenic or antimony which are sometimes soluble to a small extent in sodium hydroxide solution. While such glass may frequently be used safely with acids, the use of even dilute alkali is attended by the risk of dissolving a little arsenic or antimony. A full description of six tests to be employed will be found pp. 203-209 of the Journal of the Institute of Chemistry for June, 1920. The tests include treatment in autoclave, with reagents, heat tests, tests under polarised light for detection of internal stresses and tests for detection of arsenic and antimony.

Books Received

TECHNICAL METHODS OF ORE ANALYSIS. By Albert H. Low. Eighth edition. New York: John Wiley & Sons, Inc. London: Chapman & Hall, Ltd. Pp. 388. 19s. net.

THE PHYSICAL CHEMISTRY OF THE METALS. By Rudolph Schenck. Translated and annotated by R. S. Dean. London: Chapman & Hall, Ltd.; New York: John Wiley & Sons, Inc.

From Week to Week

Emmanuel College, Cambridge, has awarded a graduate research studentship of £200 for one year to Mr. C. H. SPIERS, B.A., for research in stereo-chemistry.

Mr. T. V. BARKER, M.A., B.Sc., has been elected to a professional fellowship at Oxford University as University Lecturer in chemical crystallography.

Restrictions on the sale of margarine and other edible fats in Germany are to be removed after August 1, and the importation of foreign raw fats permitted.

DR. J. C. DRUMMOND, lecturer in physiological chemistry at University College, has been appointed as from September 1, to the University readership in that subject.

The Anglo-American Oil Co. made a GIFT OF £10,000 to the Westminster Abbey Fund on the occasion of the unveiling of the statue to Abraham Lincoln at Westminster on Tuesday.

SIR HARMOOD-BANNER, M.P., on retiring as chairman of the Pearson & Knowles Coal & Iron Co., after 36 years association, has been presented with a silver vase and a pair of heavy candlesticks by 7,000 officials and workmen.

The text of the PROPRIETARY MEDICINES BILL has just been published, and it is hoped the bill will put an end to many abuses. Provision is made for establishing a register of proprietary preparations and appliances, and their owners. No unregistered effects are to be sold, and severe restrictions are to be put upon those that are registered.

Jordan & Sons, Ltd., inform us that during the six months from January 1 to June 30, 201 NEW CHEMICAL COMPANIES have been registered at Somerset House with an aggregate capital of £16,474,700. Of these 189 are private companies whose total capital amounts to £12,512,200. The capital of the remaining 12 companies amounts to £3,962,500.

The following APPOINTMENTS IN THE UNIVERSITY OF LONDON, King's College, have been made by the delegacy: Mr. O. Inchley, M.D. (Cantab), Lecturer in Pharmacology; Mr. C. S. Salmon, M.Sc., Lecturer in Physical Chemistry; Mr. H. W. Cremer, B.Sc., A.I.C., Lecturer in Inorganic Chemistry; Mr. W. Partridge, F.I.C., Lecturer in Chemistry (Public Health).

MR. G. B. BROOK, lecturer in non-ferrous metallurgy to the University of Sheffield, has been appointed chief chemist to the British Aluminium Co. Mr. Brook's connection with the light industries of Sheffield extends over 30 years. He was trained under Mr. A. H. Allen, Public Analyst for Sheffield and the West Riding, and was the first lecturer in non-ferrous metallurgy at the Sheffield University.

THE EMPIRE MOTOR FUELS COMMITTEE of the Imperial Motor Transport Council has recently co-opted Mr. S. Henshaw (National Benzole Association) and Professor H. B. Dixon (Manchester University) as additional members, and has appointed the following sub-committees:—Engineering: Dr. W. R. Ormandy (chairman), Colonel D. J. Smith, Messrs. G. W. Watson, G. J. Shave and Mr. F. G. Bristow (hon. secretary); Denaturation: Sir Charles Befgord (chairman), Dr. W. R. Ormandy, Mr. S. Henshaw and Mr. F. G. Bristow (hon. secretary).

DR. E. W. SMITH, until recently chief chemist Birmingham gas department (now holding an important post with the Woodall-Duckham Co., London), was the recipient on Monday of an appointments watch, and a wallet of notes with which to purchase a cabinet, from the staff of the gas department. The presentation was made by Ald. J. H. Lloyd, chairman of the committee, and high tribute was paid to the research work carried out by Dr. Smith. In acknowledging the gifts Dr. Smith said he was indebted to the department for the splendid facilities for research it had afforded.

The Health Exhibition of the ROYAL SANITARY INSTITUTE CONGRESS (which will remain open until August 5, at Bingley Hall, Birmingham) has a number of stands of chemical industrial interest. The silver medals of the Institute were awarded to the Industrial Waste Eliminators, Ltd., for waste reclamation plant; to the Paterson Engineering Co. for liquid chlorine dispensers, and the bronze medal for a reagent proportioning gear; to the Tintometer, Ltd., for an apparatus for the

quantitative determination of colour blindness; and the United Alkali Company for chloros. A number of bronze medals were also given, and an exhibition of the activated sludge process also arrested attention.

A destructive fire broke out on Sunday at the premises of NICHOLSON & Co., LTD., distillers, Three Mill Lane, Bromley-by-Bow, E. The distillery comprised buildings of two and three floors, 240 ft. by 170 ft. used as grain stores, malt mills, and drying kilns. The fire had gained considerable hold, and before the brigade could get it under control half of the premises had been severely damaged. One of the walls of the building which overhangs the canal collapsed, bringing the roof with it, and a barge filled with grain was sunk by the weight of the debris. Between 5,000 and 6,000 quarters of grain was stored in the granary, and much of it was destroyed, but the fire was prevented from spreading to the whisky tanks. Some damage was done to adjoining properties.

The text of the memorandum of agreement which has been arrived at between the French and British Governments relating to the EXPLOITATION OF OILFIELDS has been issued as a White Paper (Cd. 675). The agreement covers Franco-British interests in Rumania, Mesopotamia, Galicia, territories formerly comprised within the Russian Empire and French and British Crown Colonies. The Mesopotamian clauses provide for the participation of the native Government of Mesopotamia on a basis of one-fifth share, while France and Great Britain have shares of 18 per cent. and 62 per cent. respectively. The Mesopotamian share is the result of the voluntary surrender of the other two partners of a proportion of the rights enjoyed by them under the original Turkish concessions.

The annual report of 1919 of the GERMAN BENZOL FEDERATION states that the output was generally low, and declined in April to 4,000 tons of 90 deg. benzol, the smallest figure for over 10 years. Deliveries amounted to: 90 deg. benzol, 78,077 tons (116,520 tons); toluol, 13,739 tons (31,700 tons); solvent benzol, 13,366 tons (22,250 tons); a total of 105,182 tons (170,470 tons); so that, including the quantities consumed by the makers, the total production was only 118,056 tons (181,088 tons). Up to May last year, the price was kept at the 1915 figure of 55 mk. per 100 kilos., ex works, and was then raised to 110 mk., as compared with 400-700 mk. demanded in open market.

THE ZINC CORPORATION announces that the decision in the House of Lords on July 22 in the case of Scottish Union and National Insurance Company v. New Zealand and Australian Land Company, Ltd. (over-ruling the contrary decision in Rover & Son v. South African Breweries), that preference shareholders are not entitled to relief in respect of Colonial income-tax recovered under Section 43 of the Finance Act, 1916, renders it necessary to cancel the notice published on June 30, that income-tax at the rate of 3s. 6d. in the £ would be deducted from the dividend on the preference shares payable on July 30. Income-tax will be deductible at the full rate of 6s. in the £, and in consequence of the labour involved in preparing new warrants there is likely to be an unavoidable delay of a few days in the issue of the same.

Over a thousand men, representing the technical and commercial staffs, foremen and workmen of Brunner, Mond & Co.'s Northwich works, have presented to the directors an illuminated address, and to the chairman, Mr. Roscoe Brunner, a silver salver. The gifts were in recognition of the firm's generous treatment of the employees. Letters of good will were read from Mr. Clynes, M.P., and other trade union leaders. One wrote: "Brunner, Mond & Co. are a pattern to employers. To be in existence for 50 years without resorting to the strike weapon, especially in these latter days, is unique." Responding, Mr. Brunner said that since the war a spirit of indiscipline had shown itself among employers and employed, and without discipline no section could give good service. Profiteering and illusory rises in wages, which led to rises in prices, were bad. Strive to stop increasing wages, and manufacturers would realise that labour costs and the costs of raw material would not rise, and prices would begin to fall. He urged the adoption of a scheme securing a proper pre-war rate of wages with an addition for an increased standard of comfort, and increases or decreases according to cost of living, measured on a proper basis.

References to Current Literature

British

- ANALYSIS.** A new method for the estimation of cineole in essential oils. T. T. Cocking. *Pharm. J.*, July 24, 81-83.
 The determination of hydrocyanic acid. R. L. Morris. *Pharm. J.*, July 24, 83-85.
 The determination of lead in chemicals in acid solution. N. Evers. *Pharm. J.*, July 24, 85-86.
 Method for the determination of free acetic acid in acetylsalicylic acid (aspirin). A. R. Smith. *Pharm. J.*, July 24, 90-94.
 The detection of inorganic phosphate in glycerophosphates. J. L. Lizius. *Pharm. J.*, July 24, 100-101.
HYDROGEN PEROXIDE. Note on the preservation of hydrogen peroxide. H. R. Jensen. *Pharm. J.*, July 24, 87.
MERCURY. Mercuric oxycyanide. A. J. Jones. *Pharm. J.*, July 24, 87-89.
PERFUMES. A dictionary of odoriferous substances. T. H. Durran. *Perf. & Essent. Oil Rec.*, July 20, 258-259. Further descriptions of alcohols are given. (See also *Chem. Age*, II., 258, 359, 476.)

French

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 The incineration of organic substances in the analysis of mineral elements which they contain. Application to the analysis of blood. A. Desgrez and J. Meunier. *Comptes rend.*, July 19, 179-182.
 Immediate analysis by fractional distillation. The method of maxima and minima. C. Moureu, C. Dufraisse, and P. Robin. *Bull. Soc. Chim.*, July 5, 523-527.
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 The technique of the determination of phosphoric acid as barium phosphomolybdate. S. Posternak. *Bull. Soc. Chim.*, July 5, 564-568.
 The determination of mercury in organic compounds. M. François. *Bull. Soc. Chim.*, July 5, 568.
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IRON. The annealing of electrolytic iron. J. Cournot. *Comptes rend.*, July 19, 170-171. The conditions for complete annealing have been worked out.
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REDUCTION. Researches on the action of very finely-divided gases. C. Zenghelis. *Comptes rend.*, July 19, 167-170. The reduction of carbon dioxide by hydrogen has been studied.

United States

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 Determination of oxygen in cyanide solutions. E. M. Hamilton. *Eng. & Min. J.*, July 17, 116. A modification of White's process is described.
 Fluoremetry—Quantitative analysis by comparative fluorescence. Preliminary report. L. J. Desha. *J. Amer. Chem. Soc.*, July, 1,350-1,363.
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TAR. Tar-still operations in hardwood distillation plant. L. F. Hawley and H. N. Calderwood. *J. Ind. Eng. Chem.*, July, 684-685.

German

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ANALYSIS. Estimation of small quantities of iron as thiocyanate. R. Willstätter. *Ber.*, July 10, 1152-1154.

Rapid method for determining aromatic hydrocarbons in light petroleum. W. Hess. *Z. angew. Chem.*, July 13, 176. Addendum to a previous paper (see *Chem. Age*, III., 41).

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Estimation of sulphur in iron, steel, ores, slags, and fuels by burning in oxygen. A. Vita. *Stahl u. Eisen*, July 15, 933-938.

CARBONISATION. Estimation of yield of tar with an aluminium carbonising apparatus. F. Fischer and H. Schrader. *Z. angew. Chem.*, July 13, 172-175. A method for estimating the yield of tar from coal is described.

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Use of phenolphthalein and diphenylamine in the persulphate method for determining manganese. D. H. Wester. *Rec. Trav. Chim.*, July 15, 600-602.

Significance of specific refraction in analytical chemistry. N. Schoorl. *Rec. Trav. Chim.*, July 15, 594-599.

COPRA. A biochemical study of copra meal. F. O. Santos y Alvarez. *Philippine J. Sci.*, February, 181-189. The study was made with the object of ascertaining the food value of copra.

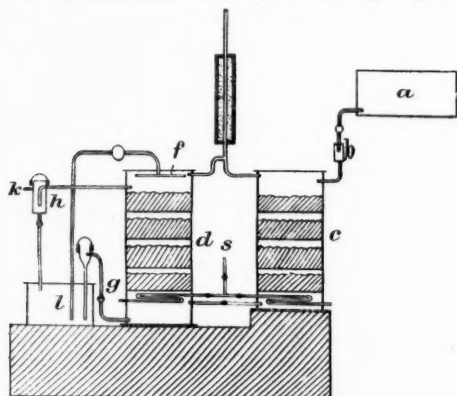
TIN. The precipitation of tin by iron. N. Bouman. *Rec. Trav. Chim.*, July 15, 537-541.

Patent Literature

Abstracts of Complete Specifications

145,099. CARBON BISULPHIDE, EXTRACTION AND RECOVERY OF. H. G. Colman and E. W. Yeoman, 1, Arundel Street, Strand, London, W.C.2. Application date, December 20, 1918.

Carbon bisulphide is completely removed from the spirits derived from coal tar by agitation with the aqueous solutions of the disulphides or other polysulphides of the alkali or alkaline earth metals or of ammonium. The coal tar spirit flows from the tank *a* to a vessel *c* charged with a material containing free sulphur, such as spent oxide, through which the liquid passes dissolving part of the sulphur. The liquid then passes to the bottom of a vessel *d*, charged with crude sodium or calcium monosulphide or lime mixed with coke. The vessels *c* and *d* may be heated by steam coils *s* at the bottom. Polysulphides are first formed in the vessel *d*, and these combine with the carbon bisulphide, forming perthiocarbonates which dissolve in water or dilute perthiocarbonate solution, which is sprayed into the vessel *d* at *f*. The purified coal tar spirit is withdrawn through a seal-pot, *h*, and pipe *k* to a storage tank. The perthiocarbonate solution is drawn off from the vessel *d* through a pipe *g* to a tank *l*, from which it is returned to the top of the vessel *d* until sufficiently concentrated. The perthiocarbonate may be directly employed as a



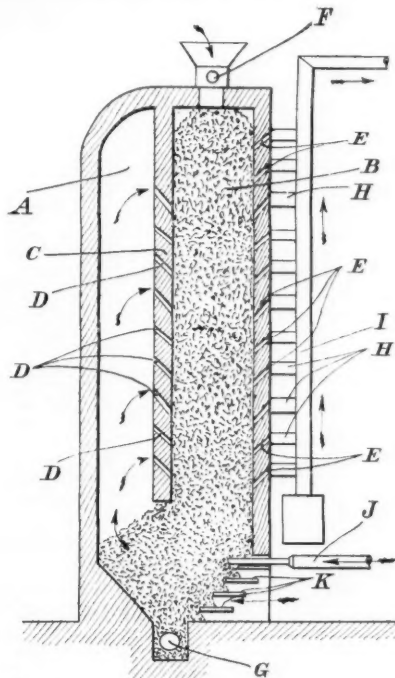
145,099

bactericide, fungicide or insecticide, or may be treated for the recovery of carbon bisulphide and sulphur. The perthiocarbonate solution may be treated with an equivalent quantity of dilute sulphuric or hydrochloric acid which converts it into a solution of the corresponding sulphate or chloride free sulphur, and sulphuretted hydrogen. Alternatively, carbon dioxide may be passed through the perthiocarbonate solution, with the production of the corresponding carbonate and liberation of sulphur, carbon bisulphide and sulphuretted hydrogen. In another alternative, sulphur dioxide is passed into the perthiocarbonate solution with agitation until the mixture is just acid when the corresponding thiosulphate is produced and free sulphur and carbon bisulphide are liberated. In another alternative, an equivalent of ferrous or ferric sulphate, or ferrous or ferric chloride, is added to the perthiocarbonate producing the sulphate or chloride, sulphides of iron, and liberating carbon bisulphide and sulphur. In another alternative, the perthiocarbonate is distilled with steam when the carbon bisulphide is driven off and the residual solution of polysulphide and hydroxide is employed to prepare further quantities of the polysulphide reagent. If hydrated ferric oxide is added before distillation, the carbon bisulphide is obtained free from sulphuretted hydrogen.

145,101. CARBONACEOUS MATERIAL, APPARATUS FOR DISTILLING. W. P. Perry, 19, Lytton Road, Leytonstone, London, E.11. Application date, January 20, 1919.

The apparatus is for distilling peat, shale or the like, and is of the type in which distillation is effected by contact of hot gas with the material. The producer is divided into two chambers, A, B, by a vertical partition C extending nearly to the bottom. The carbonaceous material is fed through a gas-

tight valve F into the distilling chamber B, and is distilled in its downward passage, the ash being removed by a screw G. Steam may be admitted through the pipe J and air between the ledges K. The partition C terminates at a level where all the carbon dioxide has been converted into monoxide, and this gas mixed with ammonia passes upwards into the chamber A in preference to the chamber B, since the latter offers more



145,101

resistance. Ports D are provided in the partition C inclined in such a way that the descending material does not pass through them, but the gas is forced through them at various levels from the chamber A to the chamber B. The material is thus gradually heated and distilled during its downward passage and the distillate and gas from the chamber A pass through the outlets E into pipes H and thence by a conduit I to a condenser.

145,128. CELLULOID, VULCANITE OR THE LIKE, PRODUCTION OF SUBSTITUTES FOR. W. T. Robinson-Bindley, 158, Worple Road, Wimbledon, London, S.W.19; A. W. Weller, 240, Oxford Street, London, W.1; and E. Dulcken, 10, Christchurch Avenue, Broadbury, London, N.W. Application date, March 21, 1919. Addition to 134,564.

The prior patent (see THE CHEMICAL AGE, Vol. I., page 697) describes a process for producing a celluloid or vulcanite substitute in which formaldehyde or a substance which yields formaldehyde is condensed with ortho, meta, or paracresol by the aid of a neutral sulphite. It is now found that other condensing agents may be used such as sodium or potassium hydroxide, or sodium carbonate, acetate, or formate. The temperature should be about 60° to 90°C, and pressure may or may not be used. The nature of the product obtained is affected by the particular catalyst used, e.g., translucent products are obtained by the use of sodium hydroxide and opaque products by the use of alkali carbonates.

145,136. GAS PRODUCERS. J. Harger, Grange Hollies, Gateacre, Liverpool. Application date, March 22, 1919.

The gas producer is for distilling coal without cracking the by-products. The fuel is admitted at the top, and two side openings are provided opposite to one another near the bottom, each being connected with a regenerator. The two regenerators are connected at their further side to a single heat inter-

changer or recuperator. When producer gas is required, air and steam or air and carbon dioxide are blown through the recuperator and one of the regenerators into the producer, and the producer gas is removed through the other regenerator and then through the recuperator to heat the incoming air and steam. When water gas is required, steam is blown through the inlet and the gas removed through the outlet until the fuel has cooled down. Air is then blown through the steam inlet for the "blow" period, and in the next "run" period steam is blown in the opposite direction followed by air also in the opposite direction.

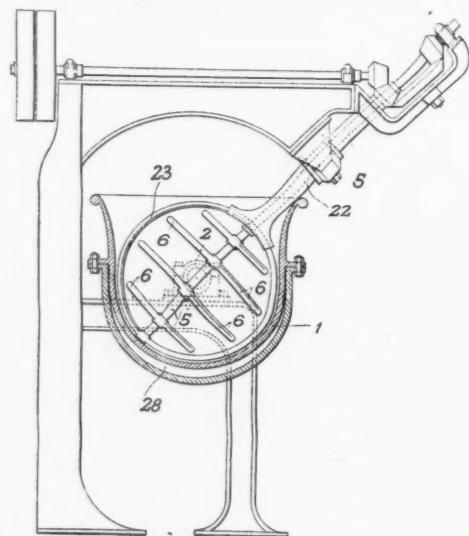
- 145,159. GRINDING OR PULVERISING ORES, AND OTHER MATERIALS, MILLS OR MACHINES FOR. R. Hush, Geldenhuis Deep, Ltd., Cleveland, Johannesburg, South Africa. Application date, March 26, 1919.

The mill is of the type in which the grinding is effected between fixed and rotating discs. The discs are contained within a casing having a door at one side which carries the fixed or non-rotating disc. The door is constructed in two parts forming a ball and socket joint so that the stationary disc may accommodate itself automatically to the revolving disc, and the two parts of the door are then secured together. The feed hopper which communicates with the space between the discs is constructed integral with the inner part of the door. The grinding faces of the discs may be corrugated radially, and one of them preferably has more corrugations than the other.

- 145,198. HYDROCARBONS, TREATMENT OF. G. F. Forwood, Mark Lane Station Buildings, London, E.C.3, and J. G. Taplay, 45, Sternhold Avenue, Streatham Hill, London, S.W.2. Application dates, April 16 and July 7, 1919.

The process is for cracking and hydrogenating hydrocarbon oils of high boiling point by passing their vapours mixed with steam over hot carbon. The carbon is preferably in the form of wood, peat, or other vegetable or animal charcoal capable of decomposing the steam and liberating hydrogen which hydrogenates the oil into a light spirit suitable for motor fuel. The temperature varies with the oil treated, e.g., paraffin oil boiling point 140° to 320°C . requires a temperature of 550° to 600°C ., kerosene oil boiling point 180° to 350°C . requires a temperature of 600° to 630°C ., solar oil boiling point 230° to 370°C . requires a temperature of 650° to 700°C ., creosote oil boiling point 180° to 270°C . requires a temperature of 650° to 750°C ., anthracene oil boiling point 270° to 400° requires a temperature of 750° to 800°C ., and some heavy fuel oils require a temperature of 850° to 950°C .

- 145,230. MIXING OR AGITATING MACHINES. Brinjes and Goodwin, Ltd., and H. P. Harris, Cold Harbour, Poplar, London, E. Application date, May 23, 1919.



145,230

This construction of mixing machine allows the contents of the pan to be stirred while the pan is being tilted to pour out

the mixture. The pan 1 is spherical or semi-spherical, and is mounted on horizontal trunnions 2. The stirring member 6 is mounted on a shaft 5, which is inclined at about 45° , so that it dips into the pan in an angular direction. A concentric sleeve 22 carries a stirrer 23, which is geared to rotate in the opposite direction. The pan may be tipped or turned over in the direction of the stirrer shaft to pour out the contents without disturbing the stirrer or stopping its rotation. The centre line of the axis of the stirring shaft passes through the axis of the trunnions in the interior of the pan, and the stirrer is of circular form, so that it sweeps out a sphere concentric with the pan. A jacket 28 for heating or cooling fluid may also be provided.

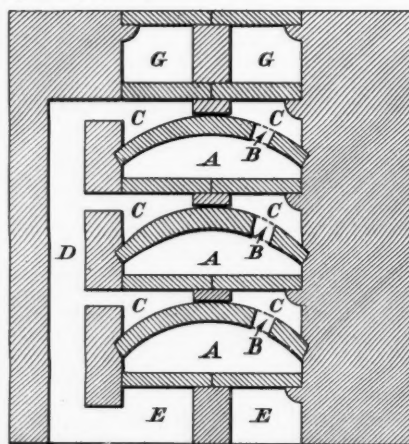
- 145,297. CLASSIFYING AND CONCENTRATING APPARATUS FOR MINERALS AND THE LIKE. W. W. Richardson, 4, London Wall Buildings, London, E.C.2. Application date, August 11, 1919. Addition to 140,266.

The prior patent 140,266 (see THE CHEMICAL AGE, Vol. II., page 447) describes a construction of trommel concentrator, the inner periphery of which is provided with a series of riffle plates arranged in sections, each section being formed in its inner face with a series of graduated longitudinal grooves and ridges intersected by a series of transverse grooves and ridges which separate the mineral matter. In the present invention the riffle is provided with a series of circumferential grooves and ridges at the feed end of the trommel and these decrease in length towards the inside of the trommel. A plain surface then intervenes, and this is followed by a series of short, longitudinal ridges of varying length, the shorter being located nearest the leading edge of the plate during rotation of the trommel. In a modification the plate is formed with a series of parallel circumferential grooves and ridges, having short connecting ridges across the grooves. Other modifications are also described. A more effective concentration of the mineral is obtained with this apparatus.

- 145,299. NITROGEN PRODUCTS, APPARATUS FOR THE PRODUCTION OF. C. T. Thorsell and H. L. R. Lunden, Sodra Hamngatan 11, Gothenburg, Sweden. Application date, August 14, 1919.

The apparatus is for the production of cyanide by the action of free nitrogen on a mixture of coal and oxygen compounds of alkali or alkaline earth metals, at a high temperature. The energy due to the high pressure of the gases in the retort at the end of the reaction is utilised by leading them into an engine working expansively and which may be used to drive a pump for compressing the nitrogen. The exhaust gases may then be used for working a combustion engine or may be led to a gas burner.

- 145,366. SPENT IRON OXIDE, FURNACE OR KILN FOR BURNING. W. Crowther, Chaseley, Cheadle, Cheshire. Application date, January 9, 1920.



145,366

Spent iron oxide is burned in a number of superposed compartments A which are shown in transverse vertical cross-section. The gas escapes through an opening B at one side

of the arched roof near the back and passes into the space C. This space is divided longitudinally by a partition, so that the gas passes along one side of the partition and back along the other side. The roof of the space C forms the floor of the burning chamber A next above so that the waste heat of the hot gas assists the combustion in the chamber above. The hot gas then passes into the common vertical flue D and then to flues E under the floor of the lowest chamber A. The gas then passes upward through another vertical flue to a horizontal flue G. The great length of the flues facilitates the deposition of the very light oxide dust. The burnt oxide is pushed off the floors of the chambers A to a common receiver at the back of the kiln.

International Specifications Not Yet Accepted

143,185 and 143,187. SYNTHETIC RESINS. M. Melamid, 56, Lorettostrasse, Freiburg, Breslau, Germany. International Convention dates, May 12 and May 13, 1919. Additions to 137,291. (See THE CHEMICAL AGE, Vol. II., page 287.)

143,185. Phenolalcohols are treated with one or more aromatic sulphochlorides containing hydroxy and/or carboxylic groups in the presence of alkali, preferably in slight excess. Resinous products are obtained and may be converted into soap-like products which may be used as emulsifying agents or in the manufacture of lubricants from tar oils.

143,187. The condensation products obtained as described in 137,291 are made hard and transparent by heating them *in vacuo* above 100°C.

143,193. OXIDISING TAR OILS. M. Melamid, 56, Lorettostrasse, Freiburg, Breslau, Germany. International Convention date, May 15, 1919.

Tar oils may be converted into more fluid oils by oxidation at low temperatures with bichromate or permanganate mixtures. Tar oil which may or may not be dissolved in benzene, is treated with bichromate mixture at 0° to 5°C. and allowed to stand. The upper layer of oil is separated from the solid resin, and then refined with 2 to 3 per cent. of sulphuric acid of 66 per cent. strength. The oil is then washed and distilled *in vacuo*.

143,212. GLUCOSE. H. Terrisse and M. Levy, 61^{bis}, Route de Lyon, Geneva. International Convention date, May 13, 1919.

Dry wood is placed in a series of externally cooled tubes which are connected together at opposite ends alternately to form a zig-zag passage. Each tube is provided with a helical mixer and conveyor, and the wood is treated with hydrochloric acid of 35 per cent. strength. Gaseous hydrochloric acid is also admitted to the tubes until the concentration reaches 41 per cent., the temperature being below 25°C. The mixture is then placed in drums mounted on hollow rotating shafts through which water is circulated to maintain the temperature between 3° and 30°C., and digestion is continued for two to eight hours. The resulting mixture containing glucose and dextrin is then placed under vacuum to withdraw excess of hydrochloric acid, water is added, and the mass then filtered and concentrated under vacuum. The mass may finally be boiled with dilute hydrochloric acid to convert the dextrin into glucose.

143,223. DESTRUCTIVE DISTILLATION. G. P. Guignard, 5, Avenue des Marronniers, Melun, Seine-et-Marne, France, and G. I. Felizet, 39, Rue Cambon, Paris. International Convention date, April 12, 1919.

Peat, shale, &c., are subjected to destructive distillation by means of steam below 600°C. at a reduced pressure, and the gases pass through a condenser to a refrigerator.

143,242. MORDANT DYES. Farbenfabriken vorm. F. Bayer & Co., Leverkusen, near Cologne. International Convention date, October 31, 1914.

In dyeing textile fabrics, paper, wood, leather, &c., with acid dyes containing amino and sulphonic groups, metatungstic acid or its compounds or salts, such as phosphotungstic acid, silico-tungstic acid or antimony tungstic acid, is added to the dye bath, or the dyeing subjected to after treatment with such salts. Lakes may also be made from

these dyes with the aid of the tungstic acid compounds mentioned.

143,243. SLAG CEMENTS. K. G. Wennerstrom, Borlange, Sweden. International Convention date, February 10, 1919.

When slag cements are prepared in an electric furnace by the addition of lime or limestone to the molten slag, carbides are sometimes formed by combination of the lime with the carbon electrodes. This is avoided by placing the lime on the surface of the molten slag and allowing it to be melted by heat from the slag without contact with the electrodes.

143,260. DIALKYL SULPHATES. L. Lilienfeld, 1, Zeltgasse, Vienna. International Convention date, December 15, 1913.

Diethyl sulphate or other dialkyl sulphates are prepared by treating alcohols mixed with phosphorus pentoxide, anhydrous sodium or copper sulphates, or other dehydrating agents, with sulphur trioxide or oleum. Carbon tetrachloride may be added as a diluent, and the product may be subjected to distillation *in vacuo* or extraction by solvents.

LATEST NOTIFICATIONS.

147,535. Bleaching and disinfecting agents. Kereszty, G., and Wolf, E. July 12, 1919.

147,541. Hydrazo-benzene and other analogous hydrazo bodies in solid form, manufacture of. July 12, 1919.

147,543. Recovery of ethylene from gaseous mixtures. Traube, W. July 14, 1919.

147,944. Treatment of residual waters containing fatty and soapy matters. Soc. Generale d'Evaporation Procèdes Prache et Bouillon. March 9, 1914.

147,945. Decomposition of soapy waters, process for. Soc. Generale d'Evaporation Procèdes Prache et Bouillon. March 3, 1914.

147,967. Manufacture of nitrogen-containing additions and condensation products from acetylene and ammonia. Chemische Fabrik Rhenania Akt.-Ges. November 20, 1913.

147,969. Bleaching of vegetable substances by means of hypochlorous acid. Ornstein, G. December 2, 1916.

147,994. Sulphuric acid. Forster & Co., R. June 24, 1918.

147,999. Treatment of crude gas to obtain ammonia solution. Still, C. (firm of). December 6, 1915.

147,101. Pyridine bases, manufacture of. Farbwerke vorm. Meister, Lucius & Bruning. December 23, 1918.

147,117. Carbonizing liquid fuels in a circulating current of gas, process and a device for. Meyer, P. June 29, 1919.

147,118. Butyric aldehyde and butyl alcohol from crotonic aldehyde. Grunstein, N. January 4, 1919.

147,119. Aldol from acetaldehyde. Grunstein, N. March 18, 1919.

147,173. Formolophenolic varnishes. Filhol, J. June 26, 1919.

147,232. Treatment of wood and other cellulose containing materials. Zellstoff-fabrik Waldhof. October 19, 1916.

147,415. Sugar and similar products from wood and other cellulose-containing materials. Zellstoff-fabrik Waldhof, and Hottenroth, V. April 18, 1917.

147,417. Charging cellulose boilers. Zellstoff-fabrik Waldhof, and Schneider, A. April 4, 1919.

147,457. Ferro-tungsten. Ampere Ges. May 6, 1918.

147,458. Ferro-chromium which is poor in carbon, process for producing. Ampere Ges. May 6, 1918.

147,474, 147,476, 147,488, 147,580. Hydrogenation of naphthalene. Schroeter, G. February 24, 1915; December 7, 1915; May 13, 1916; August 1, 1916.

147,520. Manufacture of hydrogen by means of silica and its alloys. Jaubert, G. F. March 9, 1918.

147,578. Process for hydration and the production of catalysts. Sittig, E., and Granichstaden, A. July 7, 1917.

147,633. Recovery of by-products from fuel gases. Collin Akt.-Ges. zur Herwertung von Brennstoffen und Metallen, F. J. March 3, 1919.

147,658. Manufacture of anhydrous sulphide of zinc and of lithopones. Coppet (née Duboux), Veuve M. J. I. de. September 11, 1916.

147,689. Copper sulphate. Bea, R. E. August 3, 1917.

147,703 and 147,704. Vat dyestuffs. Cassella & Co., L. July 4, 1918; March 24, 1919.

147,711. Hydrofluoric acid from natural fluorides. Verein Chemischer Fabriken Mannheim. December 27, 1918.

147,715. Distillation of hydrocarbons. Standard Oil Co. June 26, 1914.

Specifications Accepted, with Date of Application

120,554. Hydrogen sulphide, Methods of treating gases containing W. G. Leamon. November 8, 1917.

125,987. Furnaces. C. S. E. A. Cossevin. April 20, 1918.

- 126,279. Chemical reactions by catalysis, Processes and apparatus for carrying out. Soc. Chimique des Usines du Rhone. May 3, 1918.
- 140,068. Reciprocating conveyors. Soc. Anon. Anciens Etablissements. F. Wenger. March 8, 1919.
- 146,546. Ammonium sulphate. Production of. C. W. Bailey, H. S. Denny, W. H. H. Norris and H. E. F. Goold-Adams. January 5, 1918.
- 146,500. Hydrocarbon gas. Method of making. D. Macdonald and R. F. Macdonald. March 8, 1919.
- 146,583. Grinding mills. E. E. Bentall and G. C. Bingham. April 4, 1919.
- 146,508. Sulphuric acid. Extraction of arsenic and other impurities from. G. K. Davies. April 7, 1919.
- 146,600. Conveying and screening of materials. Apparatus for. Sir R. A. Hadfield and W. T. W. Miller. April 7, 1919.
- 146,589. Conveyors. C. W. Mascord. May 27, 1919.
- 146,730. Evaporators. W. J. Mellersh-Jackson. (Grimson-Russell Co.). July 28, 1919.
- 146,734. Caoutchouc. Process for vulcanising dissolved. S. J. Peachey. August 2, 1919.

Applications for Patents

- Adam, M. A. Production of organic acids. 21,777. July 20.
- Arnot, R. Azo dyes and process of manufacture. 22,015. July 22.
- " Azo dyes and process of manufacture. 22,010. July 22. (Germany, May 7, 1917.)
- Ashcroft, E. A. Synthetic manufacture of waxes, oils and or spirits of the petroleum and/or coal-tar series. 21,728. July 20.
- Bouillon, E., and Worms, M. Filters for production of cellulose threads, &c., for manufacture of artificial silk. 21,633. July 19.
- " Treatment of cellulose filaments, threads or films. 21,634. July 19.
- " Apparatus for production of threads from viscose for manufacture of artificial silk, &c. 21,635. July 19.
- Brook, E. T. Chemical fire extinguishers. 21,701. July 19.
- Cherry, L. B. Apparatus for electrochemical treatment of vapours. 21,750. July 20.
- Couche, C. W. Cooling apparatus for soap manufacture. 22,157. July 24.
- Damard Lacquer Co. Phenol aldehyde condensation products. 22,078. July 23.
- Davies, A. H. Production of dyestuff intermediates. 22,073. July 23.
- " Manufacture of dyestuffs. 22,074. July 23.
- Davis, R. H., and Levy, L. A. Apparatus for detection and estimation of carbon monoxide. 21,785. July 20.
- " Absorbent for carbon dioxide. 21,786. July 20.
- Fleet, W. F. Phenol aldehyde condensation products. 22,078. July 23.
- Imray (Soc. of Chemical Industry in Basle). Manufacture of easily soluble diazotisable azo dyestuffs. 22,090. July 23.
- " Manufacture of azo dyestuffs and intermediate products. 22,091. July 23.
- " Manufacture of easily soluble diazotisable azo dyestuffs. 22,103. July 24.
- Law, H. D. Formaldehyde producing apparatus. 22,022. July 22.
- Legg, D. A. Production of organic acids. 21,777. July 20.
- Martin, G., Roche, J. W., and Tavroges, J. Manufacture of lactose or milk sugar. 22,019. July 22.
- " Method for treatment of whey produced in cheese manufacture. 22,020. July 22.
- " Method of purification of crude lactose or milk sugar. 22,021. July 22.
- Money, G. J. Charges for chemical fire extinguishers. 21,603. July 19.
- Mont, A. A. Crystallisation of margarine emulsions, &c. 21,949. July 22.
- Morgan, J. S. Distillation of oils. 21,903. July 21.
- Naef, E. E. Manufacture of sodium compounds. 21,592. July 19.
- Ossa, A. A. Cuprous iodide processes. 21,991. July 22.
- Pickee, D. J. Process for manufacture of foodstuffs with chloride of calcium as a therapeutical mixture. 21,890. July 21.
- Potter, H. V. Phenol aldehyde condensation products. 22,078. July 23.
- Scottish Bye-Products, Ltd. Manufacture of lubricating greases. 22,136. July 24.
- Scottish Dyes, Ltd. Production of dyestuff intermediates. 22,073. July 23.
- " Manufacture of dyestuffs. 22,074. July 23.
- Seidenschneur, F. Process for extraction of paraffin from tar, &c. 22,143. July 24.
- Sieurin, S. E. Burning carbon electrodes in electric furnaces. 21,676. July 19.
- Soc. of Chemical Industry in Basle. Manufacture of easily soluble diazotisable azo-dyestuffs. 22,090. July 23.
- " Manufacture of azo-dyestuffs and intermediate products. 22,091. July 23.

Soc. of Chemical Industry in Basle. Manufacture of easily soluble diazotisable azo-dyestuffs. 22,103. July 24.

Thermal Industrial & Chemical (T. I. C.) Research Co. Distillation of oils. 21,903. July 21.

Thomas, J. Production of dyestuff intermediates. 22,073. July 23.

German-owned Patents.

DURING the war and up to the present time, British patents held by German subjects, and shares and interests held by German subjects in British patents have been vested in the Public Trustee as custodian, according to the Trading with the Enemy Amendment Act, 1914, and subsequent Acts. An order has now been issued by the Board of Trade according to which these patents revert forthwith to their original owners. This order is qualified by detailed provisions for dealing with cases in which licences have been granted, or in which compulsory licences may be applied for, the payment of royalties, and other matters affecting the holding of British patents by German subjects. As the order is somewhat intricate, any chemists or manufacturers affected by it are recommended to refer to it for fuller information.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. No.
Canada ...	Soap	82
New York ...	Chemical Products ...	114
Argentine Republic,	Oils; paints; Chemicals ...	—
Uruguay		
New York ...	Cocoanut oil; palm oil; castor oil; rapeseed oil	146
Finland (Viborg)	Chemicals; glass; raw materials for soap	127
Berne ...	Chemical products ...	141
Montreal ...	Chemicals for paper mills ...	119
Algeria ...	Chemicals; glass; paints; varnishes	145
Riga ...	Cocoanut oil; caustic soda; potash	135
Roumania ...	Chemical products ...	136
Denmark ...	Benzine barrels and railway tank cars for benzine	126

H.M. Trade Commissioner at Toronto (Mr. F. W. Field) has reported to the Department of Overseas Trade that a local firm wishes to purchase considerable quantities of the following chemicals:—Soda: ash, anhydrous sulphate, bicarbonate, bisulphite, caustic (76 per cent.), chloride, hyposulphite, nitrate, sal, silicate, tri-phosphate; Potash, nitrate; Alumina sulphate; Ammonia, granular chloride; Copper, sulphate; Zinc, sulphate; Nickel, sulphate. United Kingdom manufacturers should communicate direct with the firm referred to, whose name and address, together with particulars of their financial standing, may be obtained on application to the above Department.

In reply to Major Barnes (House of Commons, July 26), Mr. Bridgeman stated that the Sub-Committee appointed by the Central Committee under the Profiteering Acts to ascertain whether any combine exists in the soap industry, is still taking evidence, and he was unable to say when the Committee would be in a position to make its report.

In reply to Viscount Curzon (House of Commons, July 27), who asked whether Germany is under contract for three years to deliver to the Allies 35,000 tons of benzol per annum, and if so, how much of this benzol is being delivered for British consumption, Mr. Bridgeman stated that the terms of the Peace Treaty provide for the delivery to France only of 35,000 tons of benzol a year for three years.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

Market Report

THURSDAY, July 28.

Markets generally have been featureless during the current week and inclined to be quieter.

There have been a few bright spots, however, and an increasing enquiry from some quarters, and it would not be surprising to see much better business immediately after the August holidays.

The export trade shows little change.

General Chemicals

ACETONE is in quiet and steady demand, without change in value.

ACID ACETIC is in fair demand with price firm.

ACID CARBOLIC continues weak.

ACID CITRIC is stagnant, and price in buyers' favour.

ACID FORMIC is without change in price, but has only a limited demand.

ACID OXALIC is inclined to be better and many of the resale parcels appear now to have been absorbed.

ACID TARTARIC is freely offered, but the price shows little change.

ARSENIC is in short supply and price well maintained.

BARIUM SALTS are without feature, and price is steady.

COPPER SULPHATE is stagnant, but the value appears to have found its level for the time being.

FORMALDEHYDE is on the quiet side, but with short supplies the price remains fairly steady.

LEAD SALTS.—The market is quiet, but the price has not further declined.

LITHARGE is much scarcer for near delivery, and there has been some little enquiry for acetate, which, however, has not resulted in much actual business being placed.

LITHOPONE is still on offer at last prices, and is inclined to be in buyers' favour.

POTASSIUM BICHROMATE is in slightly better supply, and price is a shade easier.

POTASSIUM CHLORATE is dull, and price is declining.

POTASSIUM PERMANGANATE is very quiet and easy.

POTASSIUM PRUSSIAN has been rather quiet, but holders are not inclined to make any concessions to induce business.

SODIUM ACETATE is without change in price.

SODIUM BICHROMATE is in fair demand, and price is easier.

SODIUM CAUSTIC has been very quiet on export account, and the price has fallen appreciably for resale parcels. Stocks are, however, light, and the undertone is quite healthy.

SODIUM HYPOSULPHITE is scarce, without change in price.

SODIUM NITRITE is about the same with perhaps a slightly better demand.

SODIUM PRUSSIAN is again quiet and price is easy.

SODIUM SULPHIDE is perhaps not so sought after, but the price remains very firm.

TIN SALTS have been a little more active, with a firm demand for protochloride.

ZINC SALTS have been in better demand.

Coal Tar Intermediates

This market has been quite steady, with business moving along steadily.

There is no improvement in the supplies available and prices are well maintained.

ANILINE OIL, and SALT are in demand at last quoted prices.

BENZIDINE BASE is wanted, but supplies are very scarce.

BETA-NAPHTHOL is firmer, some of the resale parcels having been disposed of.

DIMETHYL ANILINE is in request, but little is available.

H. ACID is wanted, but cannot be obtained for early delivery.

PARANITRANILINE is a shade firmer, and makers are heavily committed through to the end of this year.

Coal Tar Products

The market is quiet for the most part and somewhat irregular. The great fluctuations in exchange on the Continent and in the United States render business difficult.

BENZOL 90's is quoted 3s. in the North and 3s. 1d. to 3s. 2d. in London.

PURE BENZOL is scarce at 3s. 4d. to 3s. 6d. per gallon.

CREOSOTE OIL is firm and in moderately good demand at 1s. to 1s. 1d. in the North and 1s. 1d. to 1s. 2d. in the South.

CRESYLIC ACID is somewhat slow in demand and is quoted 4s. 6d. to 4s. 9d. per gallon for the Pale 97.9 per cent. quality, and 4s. to 4s. 2d. per gallon for the Dark 95.97 per cent.

SOLVENT NAPHTHA 90.160 is dull and neglected, with sellers at 3s. 3d. per gallon.

HEAVY NAPHTHA 90.190 is somewhat more freely quoted at 3s. 6d. per gallon.

NAPHTHALENE is in good demand at £16 to £20 per ton for Crude and £50 to £52 per ton for Refined.

PITCH remains firm and business has been done at 190s. f.o.b. East Coast, while sellers ask 200/210s. f.o.b. London.

Sulphate of Ammonia

The demand for home consumption is still good, and the quantity available for export is very limited.

Current Prices

Chemicals

	per	£	s	d.		£	s	d.
Acetic anhydride	lb.	0	3	9	to	0	4	0
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	120	0	0	to	25	0	0
Acid, Acetic, glacial, 99-100%	ton	110	0	0	to	115	0	0
Acetic, 80% pure	ton	87	10	0	to	90	0	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	1	2	to	0	1	2½
Citric	lb.	0	5	3	to	0	5	6
Fluoric	lb.	0	0	7½	to	0	0	8
Formic, 80%	ton	115	0	0	to	120	0	0
Gallic, pure	lb.	8	6	0	to	0	8	9
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	58	0	0	to	60	0	0
Lactic, 60 vol.	ton	72	10	0	to	75	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	2	5	to	0	2	6
Acid, Phosphoric, 1.5	ton	65	0	0	to	67	0	0
Pyrogallie, cryst.	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	6	to	0	2	8
Salicylic, B.P.	lb.	0	3	3	to	0	3	6
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	0	to	0	3	3
Tartaric	lb.	0	3	6	to	0	3	8
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	93	0	0	to	95	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	45	0	0	to	50	0	0
Ammonia, .920	ton	32	10	0	to	37	10	0
Ammonia, carbonate	lb.	0	0	7½	to	—		
Ammonia, chloride	ton	105	0	0	to	110	0	0
Ammonia, muriate (galvanisers) ..	ton	60	0	0	to	65	0	0
Ammonia, nitrate	ton	65	0	0	to	70	0	0
Ammonia, phosphate	ton	130	0	0	to	135	0	0
Ammonia, sulphocyanide	lb.	0	2	9	to	0	3	0
Amyl, acetate	ton	410	0	0	to	420	0	0
Arsenic, white, powdered	ton	73	0	0	to	75	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	32	0	0	to	34	0	0
Nitrate	ton	55	0	0	to	56	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Sulphate, blanc fixe, pulp ..	ton	15	10	0	to	16	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	8

	per	£	s.	d.	£	s.	d.	
Bleaching powder, 35-37%	ton	26	0	0	to	28	0	0
Borax crystals	ton	41	0	0	to	42	10	0
Calcium acetate, Brown	ton	20	0	0	to	21	0	0
Grey	ton	35	0	0	to	37	10	0
Calcium Carbide	ton	30	0	0	to	32	0	0
Chloride	ton	9	10	0	to	10	10	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	8	0	to	0	8	3
Oxide, black	lb.	0	10	0	to	0	10	3
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	41	0	0	to	42	0	0
Cream Tartar, 98-100%	ton	290	0	0	to	295	0	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde 40% vol.	ton	34	0	0	to	34	5	0
Formusol (Rongalite)	lb.	0	4	0	to	0	4	3
Glauber salts	ton	Nominal.						
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	10	0	to	4	15	0
Lead acetate, white	ton	90	0	0	to	92	10	0
Carbonate (White Lead)	ton	70	0	0	to	72	10	0
Nitrate	ton	72	0	0	to	75	0	0
Litharge	ton	58	0	0	to	60	0	0
Lithopone, 30%	ton	52	0	0	to	54	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	13	10	0	to	14	0	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	19	0	0	to	—		
Sulphate	ton	100	0	0	to	105	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	gall.	Nominal.						
Nickel ammonium sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potassium bichromate	lb.	0	2	2	to	0	2	3
Potassium Carbonate, 90%	ton	115	0	0	to	120	0	0
Chloride	ton	Nominal.						
Chlorate	lb.	0	0	9	to	0	0	10
Meta-bisulphite, 50-52%	ton	270	0	0	to	280	0	0
Nitrate, refined	ton	65	0	0	to	67	0	0
Permanganate	lb.	0	5	0	to	0	5	3
Prussiate, red	lb.	0	5	3	to	0	5	6
Prussiate, yellow	lb.	0	2	2	to	0	2	3
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	5	10	0	to	—		
Seconds	cwt.	5	5	0	to	—		
Sodium acetate	ton	61	0	0	to	63	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	1	10	to	0	1	11
Bisulphite, 60-62%	ton	50	0	0	to	52	10	0
Sodium Chlorate	lb.	0	0	5	to	0	0	6
Caustic, 70%	ton	36	0	0	to	38	0	0
Caustic, 76%	ton	42	0	0	to	44	0	0
Hydrosulphite, powder, 85%	lb.	0	4	0	to	0	4	6
Hyposulphite, commercial	ton	35	10	0	to	37	10	0
Nitrite, 96-98%	ton	100	0	0	to	105	0	0
Phosphate, crystal	ton	43	0	0	to	45	0	0
Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	5	to	0	1	6
Sulphide, crystals	ton	30	0	0	to	32	0	0
Sulphide, solid, 60-62%	ton	62	10	0	to	65	0	0
Sulphite, cryst.	ton	15	10	0	to	16	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	90	0	0	to	95	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	19	0	0	to	19	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	lb.	0	3	4	to	0	3	5
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb.	0	2	0	to	0	2	1
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	82	10	0	to	85	0	0
Oxide, 94-95%	ton	70	0	0	to	72	10	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21	10	0	to	23	10	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	5	6	to	0	5	9
Alphanaphthylamine.....	lb.	0	4	0	to	0	4	3
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.	—	—	—	to	—	—	—
Benzaldehyde (free of chlorine).....	lb.	0	5	6	to	0	6	0
Benzidine, base	lb.	0	13	6	to	0	14	0
Benzidine, sulphate	lb.	0	10	6	to	0	11	0
Benzoic acid	lb.	0	5	6	to	0	6	0
Benzoate of soda	lb.	0	5	6	to	0	6	0
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate.....	lb.	1	6	0	to	1	7	6
Betanaphthol	lb.	0	5	6	to	0	5	9
Betanaphthylamine, technical	lb.	0	11	6	to	0	12	6
Croceine Acid, 100% basis	lb.	0	5	0	to	0	6	3
Dichlorobenzol	lb.	0	0	6	to	0	0	7
Diethylaniline	lb.	0	7	9	to	0	8	6
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	4	to	0	1	6
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	3	to	0	2	6
Dimethylaniline	lb.	0	5	0	to	0	5	6
Diphenylamine.....	lb.	0	5	0	to	0	5	3
H-Acid.....	lb.	0	14	6	to	0	15	0
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorobenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7).....	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	5	6	to	0	6	0
Naphthionate of Soda.....	lb.	0	6	0	to	0	6	6
Naphthylamin-di-sulphonic-acid...	lb.	0	5	6	to	0	6	6
Nitronaphthaline	lb.	0	1	3	to	0	1	4
Nitrotoluol	lb.	0	1	4	to	0	1	6
Orthoamidophenol, base.....	lb.	0	18	0	to	0	1	0
Orthodichlorobenzol	lb.	0	1	2	to	0	1	4
Orthotoluidine.....	lb.	0	2	6	to	0	2	9
Orthonitrotoluol.....	lb.	0	1	5	to	0	1	6
Para-amidophenol, base	lb.	0	15	0	to	0	16	6
Para-amidophenol, hydrochlor	lb.	0	15	6	to	0	16	6
Paradichlorobenzol	lb.	0	0	6	to	0	0	8
Paranitraniline	lb.	0	8	6	to	0	9	0
Paranitrophenol	lb.	0	2	6	to	0	2	9
Paranitrotoluol	lb.	0	5	3	to	0	5	6
Paraphenylenediamine, distilled ...	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	6	to	0	9	6
Phthalic anhydride	lb.	0	4	9	to	0	5	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	6	to	0	12	6
Resorcin, pure	lb.	0	17	6	to	0	1	0
Salol,	lb.	0	5	9	to	0	6	6
Shaeffer acid, 100% basis.....	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	5	to	0	1	6
Tolidine, base	lb.	0	10	6	to	0	11	6
Tolidine, mixture	lb.	0	3	0	to	0	3	6

Alsation Potash

THE demand for Alsation potash salts continues good. The following quantities have been shipped to the United Kingdom during the past week: 14 per cent. sylvinit (French kainit), 4,041 tons; 20 per cent. sylvinit (French manure salts), 2,648 tons; 50 per cent. muriate of potash, 240 tons. The following prices are quoted: Sylvinit, 14-16 per cent., £7 15s. per ton f.o.r.; sylvinit, 20 per cent., £9 15s. per ton f.o.r.; sylvinit, 30 per cent., £14 per ton f.o.r.; muriate of potash, 50 per cent., £28 7s. 6d. per ton f.o.r.

Manchester Chemical Trade

SIR S. W. ROYSE & CO., LTD., in their monthly circular state: During this month, business has, on the whole, been rather on the quiet side, but latterly there have been indications of improvement. Some products are lower in price, but, speaking generally, values have been maintained. Sulphate of copper has been dull but price has remained steady in sympathy with the firmness of the metal. The home demand has been fair, but inquiry for export has fallen away. Green copperas moves more freely with the better supply of packages. Acetates of lime are unchanged. Acetic acid is in more plentiful supply and concessions in price are offered to clear stocks, and

this has affected acetates of soda and lead, both of which are lower. Nitrate of lead has received more attention, especially for forward delivery. Carbonate of potash moves steadily and price is unchanged. There has been a good inquiry for Montreal potashes but little offering. Sulphate of potash is in good demand. White powdered arsenic continues in request, and Cornish brands command full figures, although foreign supplies are now offered at reduced rates. Little business has been passing in yellow prussiates of potash and soda, but prices have remained steady. The home demand for tartaric acid has been disappointing, especially for the time of the year and competition for business has increased. The reduction in the price of citric acid has stimulated inquiry. Cream of tartar is steady but demand has slackened somewhat. Re-sale parcels of bichromates of potash and soda are still scarce, but the position is easier through arrivals of the American products. Oxalic acid has moved freely at the lower prices offering and stocks are small. Borax and boric acid continue in short supply. Phosphate of soda is still very scarce in spite of recent arrivals from abroad. Business in lump sal ammoniac has slackened and re-sale parcels are pressed for sale. The export demand for muriate of ammonia continues, and makers are well booked ahead. Caustic soda is in increased inquiry for export. Bleaching powder is unchanged. Tar products generally maintain their firm position. Benzols are scarce with prices steady. Toluols continue firm. If anything, solvent naphthas are better, and makers expect higher values. Creosote oil continues in good demand and is obtaining higher figures. Prices of crude carbolic acid remain firm with little offering. There are stocks of crystal carbolic and no inquiry, but liquid is in good request. Pitch is in strong demand both for home and export and good business has already been done for next season at a premium on present figures, and makers are optimistic as to the course of the market. Naphthalenes are in strong request and prices are hardening, especially for refined. There is little change in sulphate of ammonia, but the export position is better, and business is now assuming more important dimensions.

The Affairs of G. E. E. Newton

An application for an order of discharge by George E. E. Newton, trading as G. E. Newton & Co., wholesale chemist, 74, Great Tower Street, E.C., who was adjudged bankrupt on November 19, 1919, was heard on Friday, July 23, at the London Bankruptcy Court.

The Official Receiver estimated the proofs of debt and probable claims at £4,100; the assets had realised £267s. 9d., and no dividend could be paid. The debtor began business under the style of G. E. Newton & Co. in November 1916 as a chemical merchant and exporter. His net profits for the first 18 months amounted to £3,000, but owing to restrictions on exports and the Government control of the chemical trade his business declined continuously after June, 1918, and at the Armistice it practically ceased. He then had recourse to professional moneylenders, and bankruptcy proceedings followed.

The Official Receiver reported that the public examination was adjourned no less than five times in consequence of the debtor's default in filing a statement of affairs, and owing to his failure to keep appointments with the Official Receiver he caused considerable inconvenience in the investigation of his affairs. The trustee in the bankruptcy also reported that the debtor showed the greatest possible reluctance in giving information about his assets. In these circumstances the Official Receiver submitted that the debtor had been guilty of misconduct in the bankruptcy in failing to perform the duties imposed on him by Section 22 of the Bankruptcy Act. Other matters raised in opposition to the discharge were: (1) that the assets were less than 10s. in the £; (2) that the debtor omitted to keep proper books of account; and (3) that he continued to trade after knowledge of insolvency.

Mr. Keen, for the debtor, said that about the time of the bankruptcy the debtor's mother was taken seriously ill and subsequently died, which was some explanation of the debtor's neglect of the bankruptcy proceedings.

The Registrar suspended the discharge for three years.

Allen Harding & Co., Ltd.

In Voluntary Liquidation

The following circular has been issued by the joint liquidators of Allen Harding & Co., Ltd., 1, Leadenhall Street, E.C. 3, and at Deptford, chemical merchants:—"On entering upon our duties in January we found the affairs, more especially the accounts, of the company in a chaotic state. The books had not been balanced or agreed for over three years and we had to retain a number of the staff on the work of posting and balancing. The work is not yet completed. The turnover in 1918 was over half a million, made up of an enormous number of complicated transactions. It will thus be realised that there has been no undue delay. At the time of our appointment there was an important action against the company in the Law Courts and a number of pending arbitration cases. These have been disposed of. We have had to defend actions in South Africa and in France, brought by creditors who attached assets in these countries. Consideration has had to be given to the claims of 428 separate creditors, and of these we have so far admitted 298. Eighty-eight have been either settled by contra account, withdrawn or rejected, and 42 still remain to be agreed. Included in the latter are three of the largest creditors, and of these two of the claims depend on the realisation of securities held at the date of the liquidation. Creditors' claims so far admitted amount to £32,037, whilst outstanding claims are, roughly, estimated at £50,000. There are also undischarged assessments on the company for income tax and excess profits duty amounting to over £13,000. These claims are preferential and although appeals against these assessments were lodged by the company we cannot successfully substantiate them until the accounts above referred to are ready to lay before the Inland Revenue authorities. We hope to be able to obtain the discharge of, or a considerable reduction in, these assessments. The amount of these unsettled claims is so large and so uncertain that we are at present unable to declare a first dividend. The present position of the realisation of assets is as follows: We have in hand to-day, after providing for the estimated expenses of the liquidation, a sum of about £12,000, and we hope to realise a further £6,000 or £7,000. We may, perhaps, add that the course of the liquidation is being followed by representatives of the creditors on the committee of inspection, who entirely agree with the decision which we are now communicating."

When the creditors were called together on January 12 last, the statement of affairs presented showed gross liabilities of £145,050, of which £82,500 was returned as unsecured, while the net assets were set down at £26,282, or a deficiency as regarded the creditors of £56,227. As regarded the contributories the deficiency was £81,227.

Research Chemicals

THE committee appointed to consider the lack of organic chemicals for research purposes, issues in the June number of the Journal of the Institute of Chemistry, three lists of chemicals compiled by the Association of British Chemical Manufacturers. The whole list includes 234 substances listed by the Chemical Society, which members of the Association made and, or were prepared to supply, 29 which they did not ordinarily manufacture, but were prepared to make, and about 123 not on the Chemical Society's List, which members of the Association made and, or were prepared to supply. The Association points out that the list includes certain substances of which the manufacturers might not be able to guarantee a permanent supply unless there were a sufficient demand. The lists should be regarded as merely preliminary, as it is hoped to supplement them from time to time. The Council of the Institute, on the recommendation of the Committee have decided to offer facilities to students and research workers by acting as a "clearing house" for substances not easily obtainable from British manufacturers and dealers. Inquiries should be addressed, in the first instance, to the Association of British Chemical Manufacturers, 166, Piccadilly, London, W. The Council invite research workers to mention substances of which they may be in special need for research purposes, on the understanding that, if any should not be obtainable through the Association, the Institute will be prepared to circularise such requirements to research workers, in order that chemists requiring such substances may be put into touch with those who have them to spare.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnership Dissolved

MOSS, JOHN, and STURMAN, ALFRED BROAD, manufacturing chemists, Barlow Row, Middle Hillgate, Stockport, Cheshire, under the style of Albert Moss & Co., by mutual consent, as and from July 21. All debts received and paid by A. B. Sturman, who will carry on the business under the present style of Albert Moss & Co.

Bankruptcy Information

READ, CURTIS, Crown Works, Guildford Street, York Road, Westminster, S.W., research chemist. July 22. First meeting August 5, 12 noon, Bankruptcy Buildings, Carey Street, London, W.C. Public examination October 12, 11 a.m., Bankruptcy Buildings, Carey Street, W.C.

Companies Winding Up Voluntarily

BELL'S ASBESTOS EASTERN AGENCY, LTD.—Liquidator, Mr. G. Lennox, 34, Fenchurch Street, E.C.

GROVE CHEMICAL COMPANY, LTD. (in voluntary liquidation).—A meeting of creditors will be held at the offices of Kidsons, Taylor & Co., 1, Booth-street, Manchester, on August 4, at 2.30 p.m. Creditors' claims on or before August 4 to the liquidator, Mr. L. D. Kidson, 1, Booth Street, Manchester.

RATOCZYŃ (GALICIA) OIL CO., LTD.—A meeting of creditors will be held at 264/273, Salisbury House, London Wall, London, E.C.2, on Monday, August 9, at 11.30 a.m. L. R. Davies and T. F. Dalglish, liquidators. The above notice is given in formal compliance with the statutes. All creditors have been or will be paid in full.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

DIXON, WILLIAM B., 17, Lord Street, Stockport, chemist. £12 10. June 18.

HOBLYN, EDWARD ROBERT, 3, King Street, Plymouth, chemist. £13 12 10. June 21.

BARHAM, J., 72, Emanuel Road, Balham, chemist. £10 4 9. June 18.

HUTCHEONS PHARMACY, 139, Golden Hillock Road, Small Heath, Birmingham, chemists. £26 11 2. June 17.

Mortgages and Charges

[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]

BELL'S UNITED ASBESTOS CO., LTD. (formerly Bell's Asbestos Co., Ltd.), London, S.E.—Registered July 13, £10,000 debentures, part of £100,000; general charge. *£85,725 11 7. June 19, 1919.

BRITISH MONOGRAM OIL CO. (1919), LTD., London, W.—Registered July 9, charge securing all moneys due or to become due to London County Westminster & Parr's Bank, Ltd.; charged on Paragon Works and other buildings, dwelling houses, &c., at Acton.

NEUCHATEL ASPHALTE CO., LTD., London, S.W.—Registered July 5 (by order on terms), mortgage or charge created out of the United Kingdom, securing £2,000 to C. E. Byrnes, Sydney, N.S.W.; charge on land in Alexandria, County Cumberland, N.S.W. *£4,600. August 14, 1919.

WESTERN GLASS BOTTLE CO., LTD., Newport (Mon.)—Registered July 6, charge securing all moneys due or to become due to Barclays Bank, Ltd.; charged on Crindan Glass Works; also registered July 6, debenture securing all moneys due or to become due to said bank; general charge.

Satisfactions

EVANS SONS, LESCHER & WEBB, LTD., Liverpool.—Satisfaction registered July 14, £4,000, part of amount outstanding July 1, 1908.

HALL'S GLUE & BONE WORKS, LTD., Nottingham.—Satisfaction registered July 21, £12,000, registered February 5, 1901.

ODAMS' NITRO-PHOSPHATE & CHEMICAL CO., LTD. (formerly ODAMS' MANURE & CHEMICAL CO., LTD.), London, E.C.—Satisfaction registered July 17, £50,000, registered January 23, 1905.

PUBLISHER'S ANNOUNCEMENT

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BICHROMATES (Potash and Soda)

HEMATINE CRYSTALS

BETA NAPHTHOL

SULPHANILIC ACID

ALPHANAPHTHYLAMINE

ANILINE OIL

DINITROCHLOROBENZOL

META-NITRO-PARA-TOLUIDINE

For British Isles or Export.

